DOE/RL-2002-65, Rev. 0

Cleanup • Constraints • Challenges (C3T)

Team Status Interim Report

November 2002

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U.S. Department of Energy
Richland Operations Office
Richland, Washington 99352

DOE/RL-2002-65, Rev. 0

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Acronyms

AEA	Atomic Energy Act
C3T	Cleanup, Constraints, and Challenges Team
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
Cs	cesium
DOE	Department of Energy
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EM	Environmental Management
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
HQ	Headquarters
IAMIT	Interagency Management Integration Team
LLW	low-level waste
MLLW	mixed low-level waste
ORP	Office of River Protection
PFP	Plutonium Finishing Plant
RCRA	Resource Conservation and Recovery Act
RL	Richland Operations Office
Sr	strontium
SST	single-shell tank
TPA	Tri-Party Agreement
TRU	Transuranic Waste
WESF	Waste Encapsulation and Storage Facility
WIPP	Waste Isolation Pilot Plant
WTP	Waste Treatment Plant

1.0 Purpose

This report provides an account of interim findings of each of the seven Cleanup, Constraints, and Challenges Team (C3T) sub-teams chartered to assess the feasibility of the previously identified Targets of Opportunity to the approved life-cycle baseline for the environmental cleanup at Hanford.

On January 24, 2002, a C3T Workshop with DOE, EPA, Ecology, and Site contractors was held where these Targets of Opportunity were discussed in-depth. The Site baseline assumptions were explained and the proposed alternative(s) (e.g., the opportunity) were explored. Many of these "targets" represented significant life-cycle savings, schedule accelerations and/or smarter ways of conducting the Hanford cleanup. Workshop participants agreed to bin the bulk of these opportunities into seven areas where multi-agency, and contractor sub-teams could be formed to conduct the feasibility analysis as follows:

- Cs/Sr Capsule Disposition
- Tank Retrieval and Closure Demonstration
- ORP Baseline Opportunities (Mission Acceleration Initiative)
- Integrated Groundwater Protection Monitoring, Assessment and Remediation
- Central Plateau Vision and Strategy
- Waste Disposal Project Options
- ORP/RL Baseline Integration and Infrastructure Optimization (Site Infrastructure and Services)

Once the targets are sufficiently mature and accepted as potentially feasible and desirable, they will be turned over to the appropriate project for incorporation into normal work processes and, where required, formal decision-making.

A subsequent C3T workshop was held on June 27--28, 2002, where the sub-team's interim findings were presented and discussed. Many of these sub-team's ideas are also represented in the recently released *Performance Management Plan for the Accelerated Cleanup of the Hanford Site*,[a] which describes DOE's vision for accelerating the cleanup completion at Hanford from 2070 to 2035.

(a) The HPMP is available at URL: http://www.hanford.gov/docs/hpmp/

2.0 Background

2.1 Cleanup, Constraints and Challenges Team (C3T) Process

Contractors for the U.S. Department of Energy (DOE), both the Richland Operations Office (RL) and the Office of River Protection (ORP), carry out the environmental management (EM) cleanup of the Hanford Site. Both the U. S. Environmental Protection Agency (EPA) and the State of Washington Department of Ecology regulate the cleanup. In 1989 these three agencies signed a comprehensive cleanup and compliance agreement referred to as the Tri-Party Agreement (TPA).

DOE, with its regulators and contractors, has been engaged in a yearlong activity known as the Cleanup, Constraints, and Challenges Team (C3T) process. C3T is an innovative project aimed at the identification, characterization and resolution of constraints and barriers to the environmental cleanup at the Hanford Site. C3T was initiated to improve the working relationships among the agencies by providing an **informal process** where innovative ideas and concepts could be jointly discussed and pursued in order to assess their viability.

The C3T process was designed to be an informal, or "off-line," process where ideas could be shared in an open and frank manner, without sacrificing any negotiated agreements or positions. If the collective sub-team felt that the ideas were sufficiently mature, then they would recommend that the ideas be **passed on to the formal process** for inclusion in the Site baselines, contracts, and for revising or updating TPA commitments if necessary so that all three would be in alignment.

In fiscal year 2002, a series of facilitated workshops was held to present the technical information from a neutral perspective and catalyze meaningful open dialogue about resolution pathways for these constraints. Comprehensive interviews were conducted and initial workshops were held in June and October of 2001. Operations research techniques were used to collect, characterize, and represent perspectives on the major constraints to Hanford cleanup.

Initially, participants agreed collectively to tackle four key issue areas that had the potential to dramatically improve the pace of the environmental cleanup and to significantly reduce the projected life-cycle cost of the cleanup. These issue areas were:

- Develop a collective and widely accepted vision of the future end state for Hanford, including those areas where such agreement largely already exists, and areas where the vision still needs major work.

- Renew commitment to the Tri-Party Agreement as the guiding document to Hanford cleanup, and work to align the contracts and other important cleanup mechanisms with the TPA. The procedures embodied in the TPA provide the flexibility to accommodate the widely accepted vision of the future end state for Hanford.

- Evaluate and appropriate reduction of unnecessary layers of requirements and procedures being applied to cleanup activities.

- Develop an "investment strategy" to ensure national support for vital Hanford cleanup activities.

The C3T process is continuing to provide a forum to collectively pursue opportunities to: accelerate risk reduction, find ways to complete cleanup sooner to protect health and the environment, and create an environment where cleanup can be conducted more efficiently. Figure 1 provides an overview of the C3T goals and objectives for re-forming Hanford's cleanup.

In the past, DOE conducted strategic planning and shared plans with regulators and stakeholders. Today, our objective is to develop a **collective** plan for Hanford, which is endorsed by the four organizations. Locally, this translates to a Tri Party Agreement that provides the vision and strategy for an effective cleanup.

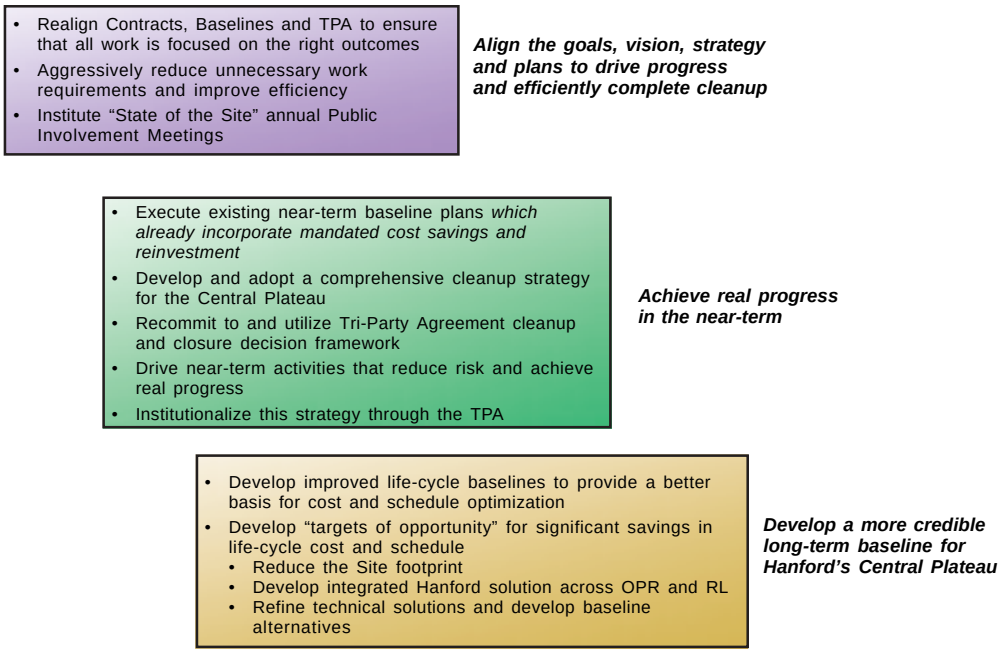


Figure 1. Strategic Planning and Alignment Approach

2.2 Identifying Targets of Opportunity

In December 2001, DOE hosted a one-day baseline workshop for its regulators, the Washington State Department of Ecology (Ecology) and the Environmental Protection Agency (EPA), to provide an overview of the baseline assumptions for the work conducted by RL and ORP. During the course of the baseline presentations, it became evident that many of the existing baseline assumptions had been overcome by new and better knowledge, or ideas surfaced that presented attractive alternatives to the baseline but needed further study.

Collectively, workshop participants identified 42 Targets of Opportunity that represented new ideas on how to conduct the same work better and in some instances how to do different work. Many of these ideas required radical changes to current thinking including the notion that some of the governing regulations might need to be approached in new and innovative ways. The regulators agreed to continue to support the analysis of these ideas in order to explore the magnitude and depth of these ideas without committing to support specific changes in existing legal drivers. Figure 2 illustrates how these Targets of Opportunity were aimed at addressing the challenge of accelerating Hanford cleanup schedules, while reducing the life-cycle costs.

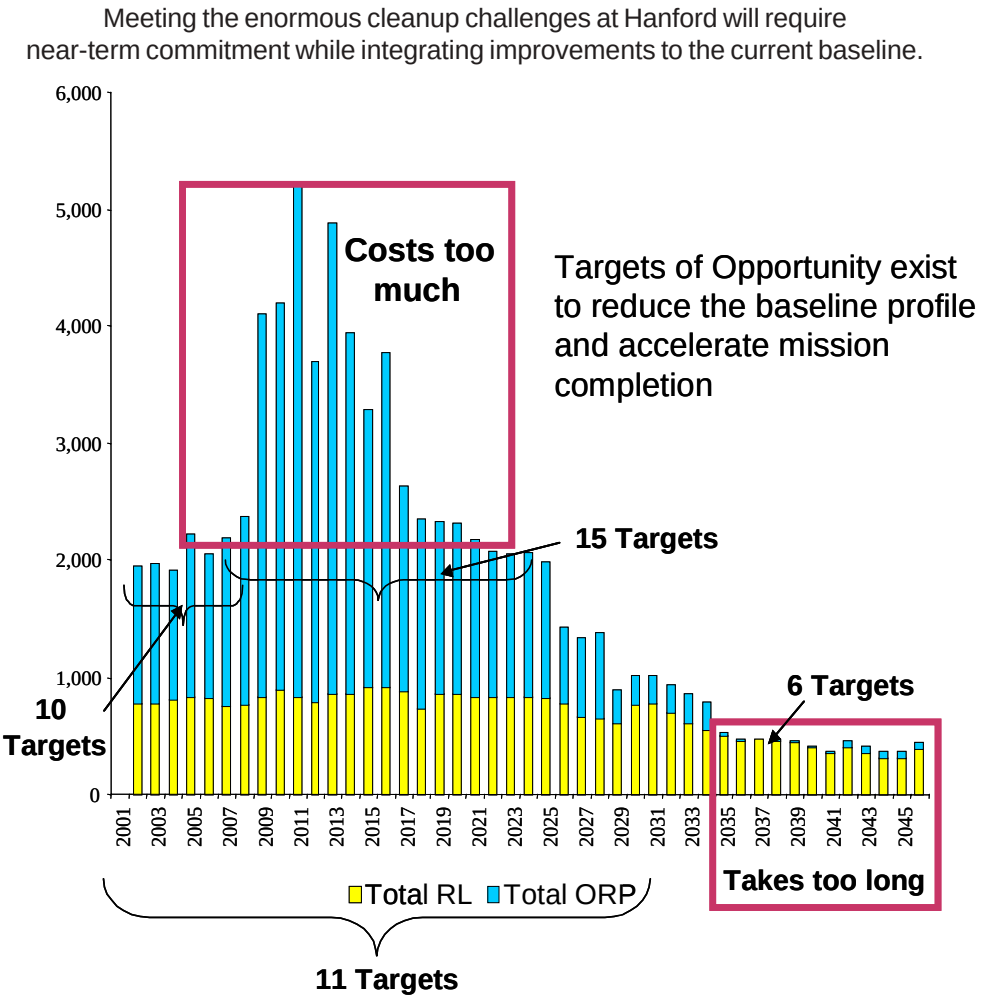
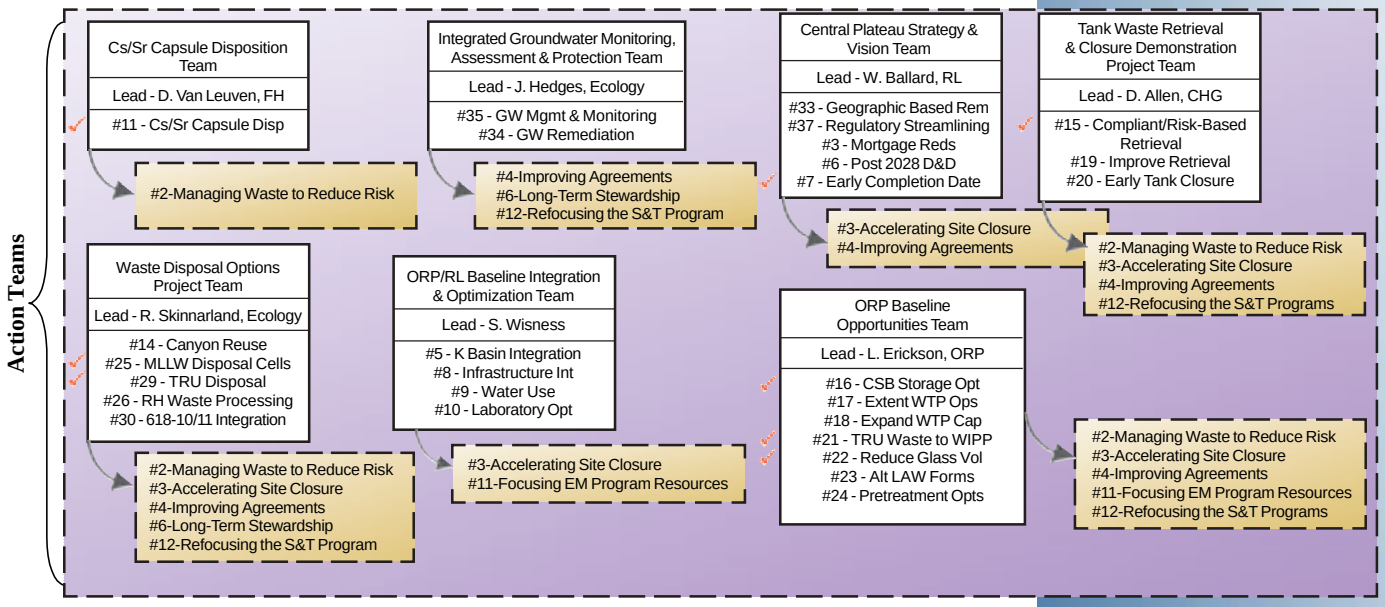


Figure 2. Targets of Opportunity Focus on Hanford's Central Plateau

On January 24, 2002, a third C3T workshop was held at which these Targets of Opportunity were discussed in-depth. The baseline assumptions were explained and the proposed alternative(s) (e.g., the opportunity) were explored. Many of these "targets" represented significant life-cycle savings, schedule accelerations, and/or smarter ways of conducting the cleanup. Participants agreed to bin the bulk of these opportunities into seven areas where multi-agency and contractor sub-teams could be formed to conduct the feasibility analysis. Figure 3 shows the Hanford sub-team assignments with the Targets of Opportunity (and associated top-to-bottom review issue areas) mapped to them.



Existing Process in Place

#	Title	Existing Process	Relevant Top-to-Bottom Issues
1	Alt Canyon Disposition	U-Plant ROD Scheduled for 9/02	#4-Improving Agreements
2	Final Reactor Disposition	TPA Milestone for Evaluation of Alternative Disposition Plans - 9/02	#4-Improving Agreements/#6-Long-Term Stewardship
4	Monolithic Hot Cell Removal	ASTD Project underway to evaluate this option	#12-Refocusing the S&T Program
12	FFTF Green Fuel Disposition	PFP has assessment underway to evaluate this option	#2-Managing Waste to Reduce Risk/#5-Safeguards & Security
13	PFP De-Inventory	PFP is working with HQ to evaluate options	#3-Accelerating Site Closure/#5-Safeguards & Security
27	TRU Super Compaction	WM has technology evaluation underway	#10-Packaging & Transportation to Support Risk Reduction
28	Rail Shipment of WIPP	WM is evaluating alternative transportation options with WIPP	#10-Packaging & Transportation to Support Risk Reduction
31	Large Scale Barriers	Will be developed as part of existing decision process in future	#2-Managing Waste to Reduce Risk/#3-Accelerating Site Closure
32	200 Area Characterization	Covered under 200 AIP and associated TPA negotiations	#3-Acc Site Closure/#4-Imp Agreements/#11-Focus EM Resources
38	300 Area Regulatory Approach	Covered under 300 AIP and associated TPA negotiations	#4-Improving Agreements/#8-Implementing NEPA
39	300 Area Lab Replacement	RL is evaluating options as part of the River Corridor RFP	#4-Improving Agreements/#8-Implementing NEPA
40	300 Area Nuclear Safety	To be worked as part of the C3T Subgroup 3	#7-Breakthrough Business Processes/#11-Focus EM Resources
41	10 CFR 830 Implementation		
42	Requirements Reductions		
36	Contractor Consolidation	Contractor Strategies to be worked as part of the C3T Subgroup 3	#1-Performance-Based Contracting

✓ Indicates where HQ Involvement is likely needed

Figure 3. Hanford's Targets of Opportunity

The focus and charter of each of the seven working sub-teams are briefly described below:

- **Cs/Sr Capsule Disposition**: The objective of this sub-team is to explore alternatives to the current baseline plan of vitrifying the 1,936 cesium and strontium (Cs/Sr) capsules that currently reside in underwater storage at the Waste Encapsulation and Storage Facility (WESF). The sub-team examined options that would reduce storage risks and costs, avoid processing and vitrification costs, and avoid the hazards inherent in repackaging materials that are currently contained in an acceptable waste form.

- **Tank Retrieval and Closure Demonstration Project**: The objective of this sub-team is to explore the potential of implementing accelerated tank closure demonstrations. In evaluating this potential, the parties will define requirements, information needs, and decision processes that would be necessary and/or warranted in order to accelerate the closure of a specific single-shell tank (or tanks) in a manner protective of human health and the environment and in compliance with applicable federal and state law.

- **ORP Baseline Opportunities (Mission Acceleration Initiatives):** The objective of this effort is to explore: 1) potential(s) to enhance Waste Treatment Plant (WTP) design and operations so as to get the most out of the investment, and 2) potential(s) to apply alternative tank waste treatment technologies to some portion of tank waste following retrieval. In evaluating these potential(s), the parties will define requirements, information needs, and decision processes that would be necessary and/or warranted in order to maximize efficient tank waste treatment in a manner fully protective of human health and the environment and in compliance with applicable federal and state law.

- **Integrated Groundwater Protection, Monitoring, Assessment, and Remediation**: The objective of this sub-team is to develop an overall strategy and approach for groundwater protection, monitoring, assessment and remediation that: focuses on protection, assessment, and remediation of groundwater; supports vadose and groundwater cleanup decisions in a timely, effective and efficient manner; satisfies regulatory requirements while coordinating the application of RCRA, CERCLA, and AEA requirements, and minimizes duplication and reduces inconsistencies for monitoring and well drilling.

- **Central Plateau Vision and Strategy**: The objective of this sub-team is to articulate a long-term vision for the Central Plateau and develop an overall strategy for making decisions that would ensure consistency, protection of human health and the environment, and efficiency.

- **Waste Disposal Project Options**: The objective of this effort is to look at options to waste disposal at Hanford. The sub-team recommends forming three-sub groups: 1) Mixed/Low Level Waste Disposal Options Sub-Group, which would focus on integrating planned and existing mixed low-level waste (MLLW) and low-level waste (LLW) disposal facilities in the Central Plateau; 2) Canyon Options Sub-Group, which would explore options for the canyon facilities including whether they should/could be used for waste storage and/or disposal and what waste could/should be put in the canyons; and 3) TRU Waste Sub-Group, which would explore opportunities for integrating transuranic (TRU) waste retrieval, treatment and disposal.

- **ORP/RL Baseline Integration & Infrastructure Optimization (Site Infrastructure and Services)**: The primary objective of this sub-team is to focus on the optimization of Site Infrastructure support. Due to planned mission acceleration initiatives and the phased "shrinking of the Site," Infrastructure should have corresponding reductions.

In early February 2002, DOE-HQ announced the results of its Top-to-Bottom Review, an in-depth assessment of the health of the EM Program, at about the same time as the January 2002 C3T Workshop. The Top-to Bottom Review identified four major findings or issues associated with the cleanup program. These major weaknesses include:

- The manner in which EM develops, solicits, selects, and manages many contracts is not focused on accelerating risk reduction and applying innovative approaches to doing the work;

- EM's cleanup strategy is not based on comprehensive, coherent, technically supported risk prioritization;
- EM's internal business processes are not structured to support accelerated risk reduction or to address its current challenge of uncontrolled cost and schedule growth; and
- The current scope of the EM program includes activities that are not focused on or supportive of an accelerated, risk-based cleanup and closure mission.

The review also provided risk-based strategies for addressing these shortcomings by both stabilizing high-risk materials and accelerating cleanup and closure actions. To fully describe the four areas of weakness, along with proposed resolution strategies, the Top-to-Bottom review team identified 12 underlying issues and developed a call to action for each. These twelve issues are listed below and are mapped to Hanford's Targets of Opportunity and C3T working sub-teams shown in Figure 3.

1. Getting More Performance from Performance-Based Contracting
2. Managing Waste to Reduce Risk
3. Developing a Programmatic Strategy for Accelerating Site Closure
4. Improving Agreements to Allow Program Success
5. Safeguards and Security: Reducing the Threat at EM Sites
6. Long-Term Stewardship for Protection of Public Health and the Environment
7. Using Breakthrough Business Processes to Accelerate Risk Reduction
8. Implementing the National Environmental Policy Act Process to Better Support EM Decision Making
9. Integrated Program for Accelerating Cleanup of Small Sites
10. Packaging and Transportation to Support Accelerated Risk Reduction
11. Focusing EM Program Resources on Cleanup
12. Refocusing the Science and Technology Program.

Through the C3T process and the assignment of sub-teams to assess the targets of opportunity in the Hanford Baseline, we discovered some clear overlap in our opportunities and the very key changes EM was looking for across the DOE complex. Overall, eleven of the twelve issue areas were found to be directly relevant to the targets of opportunity Hanford was pursuing. The remaining issue, #9, Integrated Program for Accelerating Cleanup of Small Sites, is aimed at sites with annual budgets of less than $20 million.

2.3 Hanford's Accelerated Cleanup Plan

The target of opportunity working teams fundamentally influenced Hanford's accelerated cleanup plans. Figure 4 provides a graphical representation of Hanford's cleanup reform process and shows how the targets of opportunity were used to develop the strategic initiatives that form the backbone of the *Performance Management Plan for the Accelerated Cleanup of the Hanford Site.*

The *Performance Management Plan for the Accelerated Cleanup of the Hanford Site* (August 2002) is the result of fundamental changes underway at Hanford for some time, and a renewed urgency to finish a high-quality and comprehensive cleanup. These changes have resulted from improvements in defining and focusing the work, developing and implementing contracts to perform it, and working with the Tribal governments and

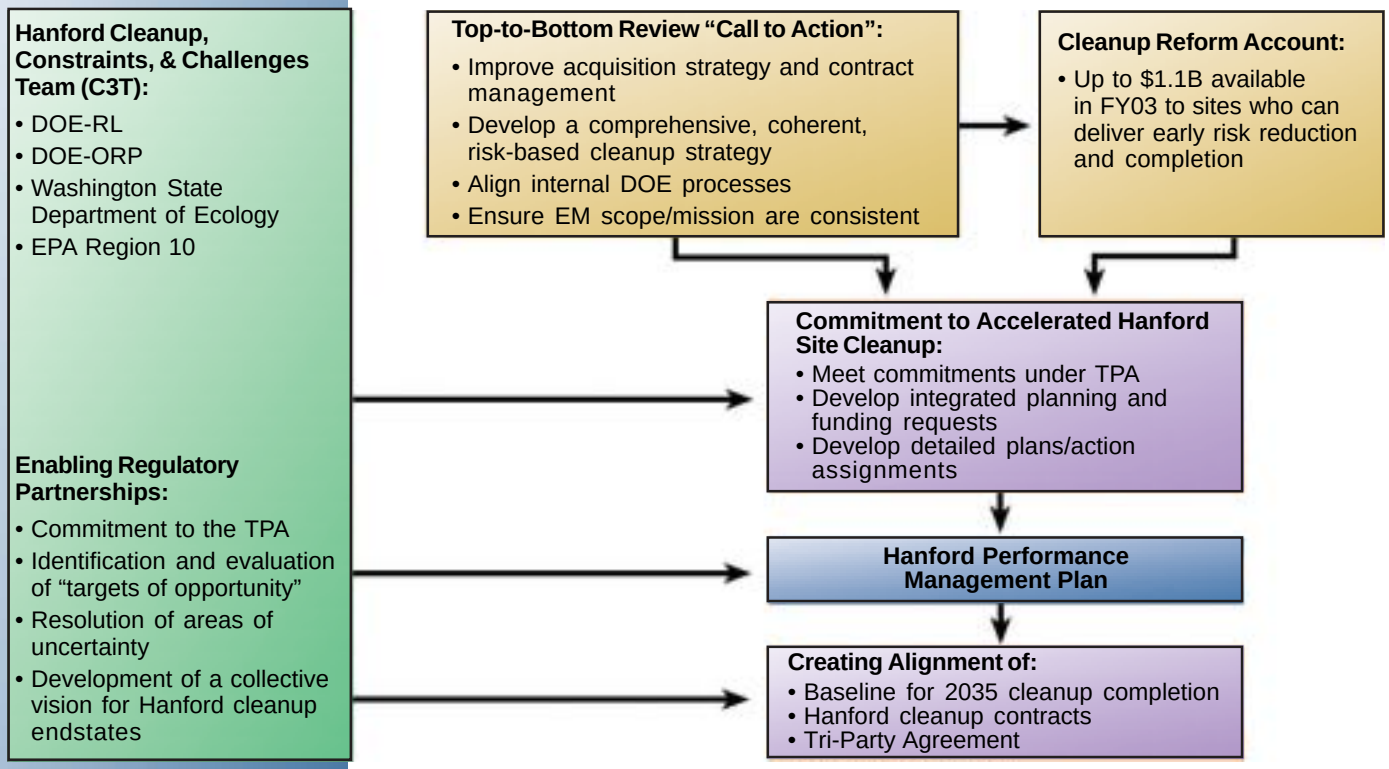


Figure 4. Hanford's Cleanup Reform Process

regulator and stakeholder communities – which have long been pushing for faster compliant progress and better results. In addition, the Administration has made accelerating cleanup a priority by enlisting management leadership with proven experience, committing additional, stable financial resources through a Cleanup Reform Account, and working with DOE sites across the country to identify further cleanup reforms and initiatives.

Hanford's accelerated cleanup plan is focused around six strategic initiatives. These initiatives, as described in the *Hanford Performance Management Plan*, are provided below. Figure 5 presents the general relation between the strategic initiatives and the targets of opportunity working teams.

Strategic Initiative 1 – *Accelerate Columbia River Corridor Cleanup by More Than 20 Years to 2012.* We will restore the Columbia River Corridor, completing remediation of 50 burial grounds, 579 waste sites, 357 excess facilities, and 7 plutonium production reactors by 2012, reducing risk to the river, and shrinking Hanford Site operations.

Strategic Initiative 2 – *Accelerate Tank Waste Treatment Completion by 20 Years.* We will take several near-term actions to ensure the tank waste program ends by 2033: 1) accelerate tank waste retrieval, 2) complete tank waste treatment by 2028 by increasing the capacity of the planned WTP and using supplemental technologies for waste treatment and immobilization, and 3) demonstrate tank closure and start in earnest the process of closing tanks now. Many of the activities related to tank waste are on the "critical path" to site closure; the Site cannot be closed until they are done.

Strategic Initiative 3 – *Accelerate Stabilization and De-Inventory of Nuclear Materials.* We will accelerate the cleanup of Hanford's other urgent risks by removing from the river's

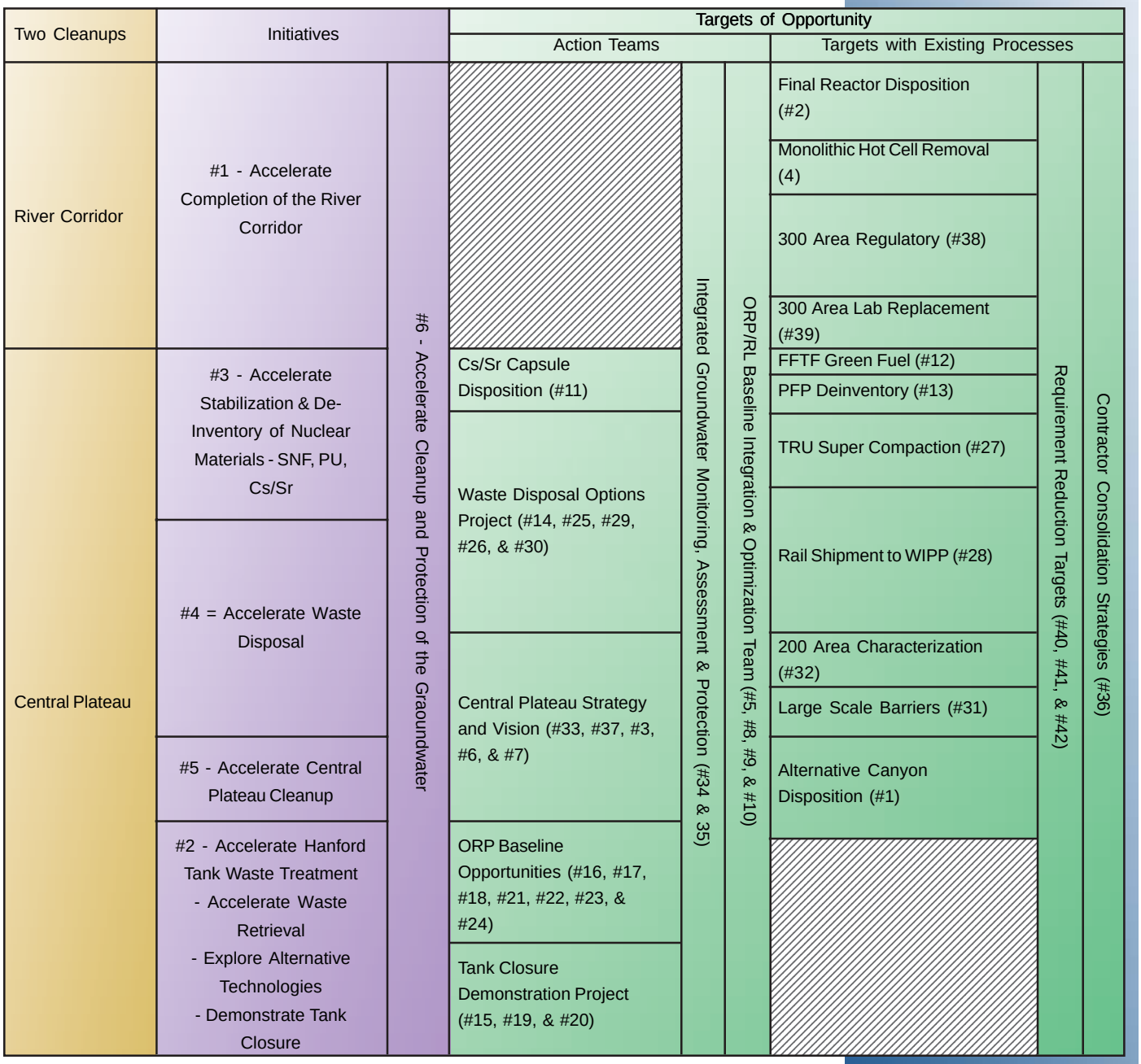


Figure 5. Accelerated Cleanup Initiatives and Targets of Opportunity

edge K Basins' spent nuclear fuel, sludge, debris and water 10 months early; stabilizing and securely storing our remaining plutonium 9 years sooner; and demolishing the Plutonium Finishing Plant (PFP) 7 years earlier. In addition, we will evaluate the benefits of moving our 1,936 high-radiation-level cesium and strontium capsules to a secure dry storage facility and seek a path to allow us to directly ship the capsules (non-vitrified) to the national geologic repository. This would avoid the risk, time and cost associated with processing the capsules for vitrification at the WTP.

Strategic Initiative 4 – *Accelerate Waste Disposal.* Waste disposal poses another set of challenges to completion by 2035. We plan to accelerate treatment and disposal of mixed low-level waste and retrieval and shipment of transuranic waste offsite 5 to 10 years ahead of current plans. We will work with other DOE sites to ensure that disposal capability exists to meet DOE mission and closure schedules.

Strategic Initiative 5 – *Accelerate Central Plateau Cleanup.* We will use regional or other waste site grouping strategies to clean up the Central Plateau's 900 excess facilities (including the five massive plutonium separation and processing facilities or "canyons") and more than 800 non-tank-farm waste sites. We will use U Plant to demonstrate our ability to disposition canyon facilities in place (the Canyon Disposition Initiative) and remediate the associated waste sites at the same time. With the exception of T Plant, which is needed for final waste operations, we expect to disposition the canyon facilities nearly 14 years early.

Strategic Initiative 6 – *Accelerate Cleanup and Protection of Hanford Groundwater.* We will protect groundwater resources by removing or isolating the highest-risk contaminant sources on the Central Plateau, remediating the contamination sources exterior to the Central Plateau core zone, dramatically reducing the conditions that have the potential to drive contaminants into the groundwater, treating the groundwater, and integrating all site monitoring requirements. We are accelerating high-risk waste site remediation by 5 years to better protect groundwater.

Further refinement and execution of these strategic initiatives will be supported by the continued efforts of the targets of opportunity working teams. Fundamental to our ability to succeed will be the partnership we have built and will continue to nurture with our regulators. The regulators played key roles in the initial development of these strategic initiatives, and DOE is working closely with them to address their concerns and move toward consensus on a path forward.

3.0 Sub-Team Status

At the fourth C3T workshop held June 27–28, 2002, each of the seven sub-teams presented the status of their respective studies. The purpose of this workshop was to discuss policy issues associated with the Targets of Opportunity and the *Hanford Performance Management Plan*, and to craft a course for how the agencies can continue to maintain the dialogue and urgency of action for cleanup of the Hanford site. The outcomes of the discussions and directions for follow-on work include:

- **Cs/Sr Capsule Disposition:** The sub-team identified four alternative disposition paths as alternatives to the current plan of vitrifying the Cs/Sr capsules currently stored underwater at WESF. Each of the alternatives to vitrification could potentially resolve vulnerability issues, accelerate capsule disposition, and/or reduce life-cycle cost. All disposition paths lead to disposal of capsules offsite. For planning purposes it was decided that disposition of the Cs/Sr capsules would be interim, onsite dry storage, then direct disposal at Yucca Mountain rather than the current vitrification plan. In addition, DOE-HQ will pursue a non-vitrification pathway for repository disposition of capsules. Vitrification will remain as a possible option should the capsules not be accepted at Yucca Mountain in a non-vitrified form. The overall goal is to reduce storage risks and costs, avoid processing and vitrification costs, and avoid the hazards inherent in repackaging the capsule materials.

- **Tank Waste Retrieval and Closure Demonstration**: Current plans would close the first single-shell tank (SST) in 2014. This sub-team was chartered to develop a work plan for conducting tank closure demonstrations and determining the requirements for establishing tank closure. The goal of the demonstration project is to evaluate the potential for, and to design initial single-shell tank (SST) waste retrieval and closure demonstrations enabling the parties to begin the process of SST closure in a manner supporting the acceleration of Hanford Site cleanup.

- **ORP Baseline Opportunities:** This sub-team explored ways to complete tank waste treatment and how to get the most out of the Waste Treatment Plant by both enhancing the WTP operations and adding non-WTP treatment. After evaluating many technologies, this sub-team identified four technologies that they want to test on Hanford waste to support deployment decisions. They are: bulk vitrification, steam reforming, containerized grout, and sulfate removal. Success of one of these technologies is necessary for the successful completion of tank waste treatment by 2028.

- **Integrated Groundwater Monitoring, Assessment and Protection:** This sub-team will complete a strategy by October 2002 that will articulate what we are currently doing to protect and remediate groundwater, will redefine M-24 to be a comprehensive monitoring well milestone [not just RCRA], and develop a communication package to support continued public involvement. The "Gang of Four"[(a)] applauded the significant progress that has been made this past year to better understand and articulate Hanford's groundwater strategy.

(a) The "Gang of Four" — Keith A. Klein, Manager, U.S. Department of Energy Richland Operations Office; Roy J. Schepens, Manager, U.S. Department of Energy Office of River Protection; Tom C. Fitzsimmons, Director, State of Washington Department of Ecology; L. John Iani, Regional Administrator, U.S. Environmental Protection Agency, Region 10.

- **Central Plateau Vision and Strategy:** This activity is focused on developing an overall strategy for making decisions on the Central Plateau that would ensure consistency, protection of human health and the environment, and efficiency. The agencies endorsed the proposed vision and framework of the Central Plateau, which is guided by an industrial land use scenario. The Tri-Parties memorialized the risk framework agreement in a letter responding to Hanford Advisory Board Consensus Advice #132. This response and the agreed-upon risk framework are included in the Central Plateau sub-team's interim status report (refer to Appendix E). It was also recognized that formal decision and public involvement processes need to occur.

- **Waste Disposal Options**

  - **Canyons:** This sub-team focused on the U Plant Disposal Initiative. The sub-group recommends that no outside waste be brought into the canyon for disposal. Schedules and approaches for the other canyons are being developed to support accelerated cleanup.

  - **Low Level Waste/Mixed Low Level Waste:** It was recommended that the use of ERDF be expanded for other Hanford waste, but not for offsite waste. The sub-group will examine the total Site contaminant inventories to better determine whether ERDF can handle this future disposal demand.

  - **Transuranic Waste:** The agencies agreed to adopt as a "guiding principle" that they would eliminate the distinction between pre- and post- 1970s TRU. The sub-group recommended adopting a risk-based approach to ensure that TRU is treated the same way. The sub-group will articulate path forward and regulatory options – including the possibility of an EIS. There was also discussion of treating limited quantities of TRU from other sites using mobile characterization units and accelerate preparation of Hanford's TRU for shipment to WIPP. The sub-group will develop advantages and disadvantages to the latter.

- **ORP/RL Baseline Integration & Infrastructure Optimization (Site Infrastructure and Services):** The Infrastructure & Site Services sub-team is looking at different methodologies to optimize its services consistent with the Site acceleration plans. The sub-team was asked to look at communicating progress in "layman's" terms by developing useful metrics to communicate progress.

Following the June 2002 C3T workshop, each of the seven working sub-teams prepared detailed status reports summarizing the progress made during the past fiscal year. Each of these reports is included as an appendix to this document.

4.0 Proposed Path Forward for Continuing the Tri-Party Dialogue for Eliminating Constraints to Hanford Cleanup

We do not want to lose the value that C3T has brought to accelerating Hanford cleanup progress. DOE, EPA, Ecology, and the participating contractors have committed to continuing the informal C3T process allowing them to continue sharing ideas and identifying constraints that hamper Hanford cleanup progress, in an open and frank manner, without sacrificing any negotiated agreements or positions. When we believe ideas are sufficiently mature, they will be passed on to the formal process for inclusion in the Site baselines, contracts, and for revising or updating TPA commitments if necessary. In essence, the ideas and concepts developed under the C3T process will be used to inform the existing process under the TPA for formal decision-making through the existing Interagency Management Integration Team (IAMIT).

Within the IAMIT forum, we will continue to focus on the major themes that were part of C3T:

- Developing a collective and widely accepted vision of the future Hanford end state.
- Ensuring the TPA is the governing document to Hanford cleanup and ensuring alignment of the TPA, baselines and contracts.
- Eliminating unnecessary requirements.
- Ensuring national support for Hanford cleanup.

It is proposed that the monthly IAMIT meeting will be expanded to include the status of each C3T sub-team. The teams will then use the IAMIT members as a sounding board for issues requiring resolution, decisions that need to be elevated to senior agency management and overall integration of individual sub-team work

Overall, the intent is to continue to collectively pursue opportunities to accelerate risk reduction, complete the Site cleanup sooner, and create an environment where cleanup can be conducted more efficiently in order to protect health and the environment.

Appendices

The C3T sub-teams reported in various formats in the June 2002 workshop. What is presented here are those sub-team reports or updated materials where available. These reports may have been reformatted for presentation; however, no changes have been made in the content.

Appendix A – Capsule Disposition Report

Cs/Sr Capsule Disposition
Team Report

Updated August 8, 2002

Fluor Hanford

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Cs/Sr Capsule Disposition

Charter: **Examine alternatives to the current baseline plan for treatment, storage and disposal of 1,936 Cs/Sr capsules that currently reside in underwater storage at WESF.**

Team Members:

- **FH - Dave Van Leuven (Team Lead), Art Lee, Dewey Robbins, Kent Smith, Brian Oldfield, Dennis McCall**
- **RL - Pete Knollmeyer, Sen Moy, Paul Macbeth**
- **ORP - Leif Erickson, Philip LaMont, Ed Randklev**
- **Ecology - Laura Cusack**
- **CHG – Steve Schaus, Bruce Higley, Jim Honeyman**
- **NHC – Gilles Chevrier**
- **PEC – Mario Pereira**

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Cs/Sr Capsule Disposition

Guiding Principles:

- **Scope is limited to the existing 1,936 capsules stored in WESF.**
- **Excludes all other on-Site Cs/Sr (e.g., Cs/Sr in tanks).**
- **Will not consider beneficial commercial use of Cs/Sr capsules.**
- **It is unacceptable at this time to commit the Cs/Sr capsules (approximately one-third of the DOE radionuclide inventory at Hanford) to permanent on-Site disposal.**

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Agreements Reached by the Team

- **Five capsule disposition paths identified - the baseline and four alternative paths**
- **Alternatives evaluated against selection criteria**
  - **alternatives could resolve vulnerability issues, accelerate capsule disposition, and/or reduce life cycle cost as compared to the baseline**
- **More detailed engineering studies needed to develop defensible cost and schedule estimates**

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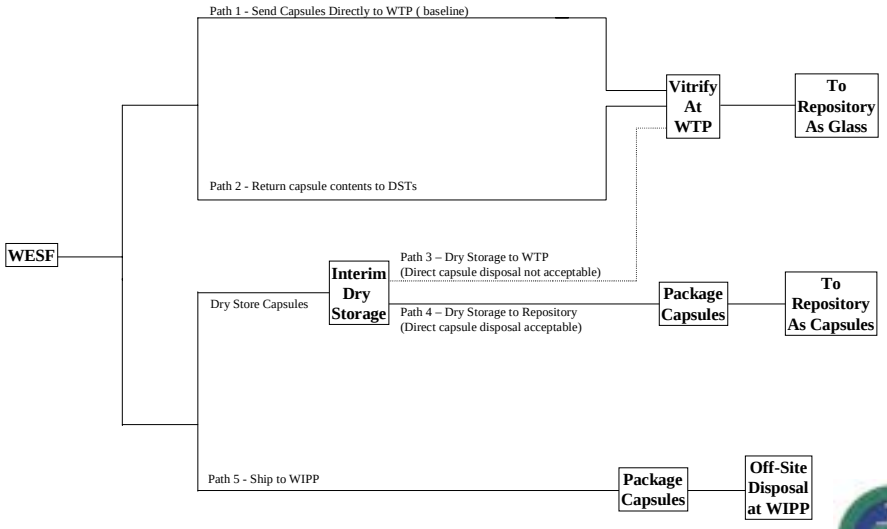
Capsule Disposition Paths



Fluor Hanford

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Capsule Disposition Paths (cont)

- **All five disposition paths lead to disposal of capsules off-Site**
- **Interim Dry Storage maintains capability to send capsules to WTP for processing if direct disposal of capsules at Yucca Mountain is not acceptable**

Fluor Hanford

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Path Forward

Decisions Made at the C3T Workshop June 27-28

- **The planning basis for disposition of Cs/Sr capsules will be Interim Dry Storage, then direct disposal at the HLW repository rather than the baseline plan to vitrify them.**
- **The vitrification option will be kept available.**
- **DOE-HQ will pursue a non-vitrification pathway for repository disposition of capsules.**

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Path Forward (cont)

- **Perform engineering analyses in FY 2003 to address:**
  - **The benefits of dry storage, including suitable onsite storage locations for the interim**
  - **Packaging and transportation for moving the capsules to dry storage onsite and identify the number and configuration of packages needed**
  - **WESF upgrades needed for loading capsules for dry storage**
  - **Packaging required to meet appropriate repository waste acceptance criteria**
- **Obtain RL approval of the preferred option in FY 2003**
- **Initiate work in FY 2004 including:**
  - **RCRA permitting needs for selected alternative**
  - **System design/procurement, as necessary, for preferred option**

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Path Forward (cont)

- **Obtain key decisions in the following areas:**
  - **Successfully negotiate an Agreement-In-Principle with OCRWM for the Yucca Mountain Repository that:**
    - **waste acceptance criteria will be revised to accept the capsules (non-vitrified); and**
    - **addresses LDR standards**
  - **Obtain approval to directly ship capsules to Yucca Mountain Repository by 2012**
    - **If approval is not obtained, capsules will be incorporated into ORP baseline for vitrification**

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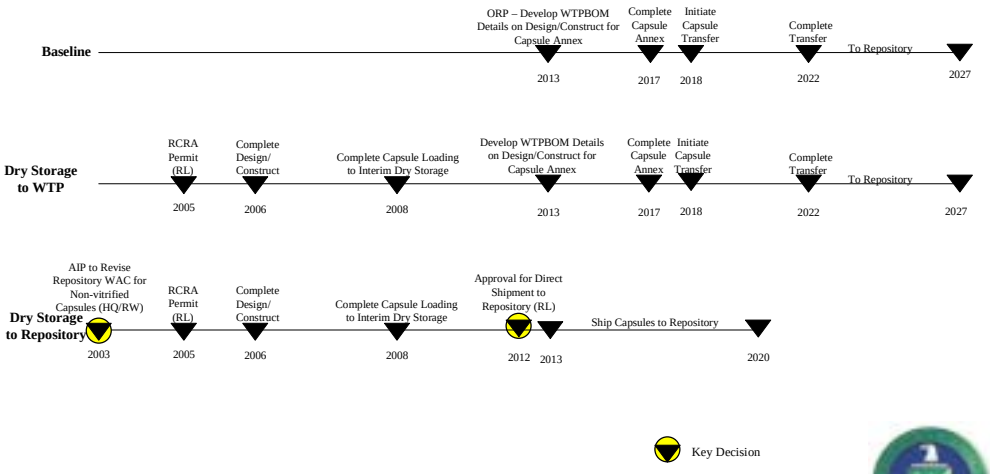
Key Decision/Policy Issues



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Key Decision/Policy Issues (cont)

- **Decision:** Revise Repository Waste Acceptance Criteria to allow disposal of capsules off-Site at Yucca Mountain in their current form (i.e., salt form capsule contents).
- **Decision Maker:** DOE-HQ/RW
- **Issue**: Need to obtain an Agreement-in-Principle with the Office of Civilian Radioactive Waste Management for the Yucca Mountain Repository to revise the Waste Acceptance Criteria to accept the capsules (non-vitrified) and to address LDR standards.
- **Discussion**: A decision on the preferred capsule disposition option is planned in late FY 2003. Approval to disposition capsules in non-vitrified form will require coordination of RCRA, NEPA, and DOE O 435.1 requirements for design, construction, transportation, and waste acceptance. The DOE/RW-0351, Civilian Radioactive Waste Management System - Waste Acceptance System Requirements Document (WASRD), states that only HLW and/or SNF that is not subject to regulation as hazardous waste under RCRA Subtitle C is acceptable for disposal at the Yucca Mountain Repository. The WASRD also requires that the standard vitrified HLW form shall be borosilicate glass sealed inside an austenitic stainless steel canister(s) with a concentric neck and lifting flange. The capsules and their contents are currently designated as dangerous waste and contain wastes identified in 40 CFR 261. In addition, the cesium chloride and strontium fluoride salt forms of the capsule contents do not conform to the borosilicate glass form specified in the WASRD.

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Key Decision/Policy Issues (cont)

- **Decision:** Obtain approval to package and ship capsules to Yucca Mountain in their current form (i.e., salt form capsule contents) for direct disposal.
- **Decision Maker:** DOE-RL
- **Issue**: Need to obtain approval to directly ship capsules to the Yucca Mountain Repository by September 2012.
- **Discussion**: This decision assumes Agreement-in-Principle is reached with OCRWM to revise the Repository Waste Acceptance Criteria to accept Cs/Sr capsules in a non-vitrified form. The decision to dispose of capsules at Yucca Mountain in their current form or to vitrify the contents is needed as part of the supplement to the Tank Waste Remediation System EIS Record of Decision for capsule disposition. Should the capsules need to be vitrified, DOE-ORP needs notification by September 2012 to incorporate the capsules into their baseline to allow completion of vitrification by 2028.

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Appendix B – Tank Retrieval and Closure Demonstration Project

C3T Accelerated Retrieval and Closure Demonstration Team Status Report for Gang of Five, June 21, 2002

1) Statement of Scope (Team Charter)

Pursuant to the ARCD team charter, our objectives have been to evaluate the potential for, and to design initial single-shell tank (SST) waste retrieval and closure demonstrations enabling the parties to begin the process of SST closure in a manner supporting the acceleration of Hanford site cleanup.

2) Agreements Reached by the Team

a) SST waste retrieval and closure demonstration projects will be undertaken at an initial set of 4 tanks comprised of both high risk waste tanks (significant volumes), and tanks with low volumes and (consequently) less risk. An additional 4, low volume tanks were considered for potential demonstration, however, agreement was not reached on the extent or necessity of retrieval prior to closure to support a team consensus for recommendation of a near term demonstration.

b) All demonstrations will include a waste retrieval component (or components), as required by Washington's Hazardous Waste Management Act, HFFACO Milestone M-45, and its associated Appendix H. Tank selection and team agreement for this process assumed that retrieval would precede closure per the TPA.

c) Demonstration activities will be limited to tank-only actions (e.g., retrieval, isolation of equipment, possible treatment and/or stabilization of residuals, possible filling of tank void space, and possible installation of interim surface barrier. Demonstration activities will not include remediation of ancillary equipment or contaminated soils during the demonstration.

d) Existing HFFACO requirements for SST waste retrieval technology and initial retrieval demonstrations in tanks (C104, S102, and S112) will be maintained and met independent of the parties retrieval and closure demonstrations.

e) Tank Selection Criteria: The team has spent a substantial amount of time identifying principal tank selection criteria which include, but are not limited to: Accelerated Risk Reduction, Chance for Success, Ease of Implementation, Data Availability, Potential Programmatic Impacts, and potential Cost and Schedule to Implement.

f) As a result of the team's evaluations we have concluded that (with the possible exception of tank U-107) demonstrations should be selected from the AX, C, and S Tank Farms. We have concluded that the parties' objectives will best be served by the selection of an initial set of four (4) tanks (3 high risk waste, and 1 low-volume) for demonstration purposes.

Regulatory Documentation and Process Path Forward

Recognizing that one of the principal objectives of the parties' demonstrations will be the identification, development, and exercise of retrieval/closure processes, the team has also agreed to the following:

g) Demonstration activities will be allowed through the hazardous waste facility permitting process administered by Ecology, pursuant to the HWMA and its implementing regulations. This will ensure public awareness and participation in decision-making as the sitewide "RCRA" permit is modified to allow demonstration activities.

h) To support demonstration projects, a *framework SST System Closure Plan* will be developed, incorporating as many elements of a final closure plan for the Hanford tanks as are known at this time. Sections of the Closure Work Plan Update, to be submitted for Ecology review on June 30, 2002, will be incorporated into the framework.

i) As more information becomes available, e.g., through continuing data acquisition activities and the Closure Work Plan Update approval process, the *Framework* will be further developed.

j) The Framework will contain a compliance schedule and key definitions.

k) An individual retrieval and closure demonstration plan (or plans) for a single tank or group of tanks will be developed and submitted in parallel to the *Framework*. Tanks may be grouped together in a single plan, even if they are not in the same Waste Management Area.

l) The requirements for both the Framework and the individual/group tank demonstration plans will be developed in the immediate future through cooperation of the regulators and the Office of River Protection and its contractors.

m) As additional information becomes available or further agreements are made they will be added into the individual plans and Framework, as appropriate.

n) The Framework and individual plan(s) will be submitted as a modification to the sitewide permit. It has been agreed that the permit modification process will be fast-tracked to support the initial retrieval and closure demonstrations while allowing adequate time for public review and comment. The schedule for these (Closure Plan framework and specific tank plan) negotiations has not yet been agreed upon.

3. Projected Path Forward Schedule

Recommend that ORP and Ecology move forward in the design and implementation of accelerated waste retrieval and closure demonstrations.

a) June 2002: Submittal of SST Closure Workplan
b) July 2002: Tank selections and finalization of associated HFFACO Change Request

c) November 2002: Submittal of framework SST System Closure Plan, initial demonstration plans and permit modifications.
d) December 2002: Initiation of Retrieval activities in the demonstration tanks.
e)* DOE submittal of retrieval results, analysis of residuals, and (if appropriate) request for waiver pursuant to HFFACO Appendix H.
f)* Completion of waste retrieval and closure demonstrations (e.g., waste retrieval, possible treatment and/or stabilization of residuals, possible filling of tank void space, possible installation of interim surface barrier).

4. Key Decision/Policy Issues Requiring Resolution

To what extent must DOE retrieve waste from each SST? (Note: The team recognizes that this is an issue that will require substantial work in the coming year as DOE and Ecology begin to address how to proceed towards closure.)

Recommend agency executive management approval to proceed on agreed to tanks.

5. Potential Cost Savings From Implementation of the Opportunity

Potential cost and schedule savings are substantial to major. By implementing accelerated retrieval and closure demonstrations the parties are moving into the arena of closure over 10 years earlier than planned. Implementing these demonstrations will enable the parties to further define retrieval and closure requirements, and to establish a sound retrieval and closure process for use as the parties move forward.

Demonstrating closure of individual tanks is expected to lead to agreements on accelerating the closure of Waste Management Areas (currently planned to occur between 2012 and 2014, per HFFACO M-45-00). This will result in cost savings from reduced long-term maintenance and operations of tank farms.

* TPA requirements to be established prior to August 1, 2002.

Appendix C – ORP Baseline Opportunities (Mission Acceleration Initiatives)

June 18, 2002
Cleanup, Constraints, Challenges Team (C3T)
Mission Acceleration Initiative Team Report

1) Statement of Scope (Team Charter)

Pursuant to the Mission Acceleration Initiative (MAI) team charter, our objectives have been to explore: a) potential option(s) to enhance Waste Treatment Plant (WTP) design and operations so as to get the most out of the parties' investment, and b) potential option(s) to apply supplemental tank waste treatment technologies to some portion of tank waste following retrieval.

The team has focused on technologies to supplement the WTP's Low Activity Waste (LAW) treatment capabilities via the Cleanup Challenge and Constraints Team (C3T) process using Hanford, regulatory agency, and independent, external expertise. The team also recognized that High-Level Waste (HLW) treatment capability within the WTP would need augmentation (e.g., a second melter).

2) Agreements Reached By the Team

a) The WTP, per current contract requirements, will not have the capability to complete tank waste treatment by 2028. The Office of River Protection (ORP) has advised the Washington State Department of Ecology that the high volume of LAW feed poses the most difficult challenge. Completing LAW treatment by 2028 would require making optimal use of the WTP to maximize its throughput through its design life and also providing supplemental LAW treatment approaches where it is appropriate and possible to do so.

b) In determining which (potential) supplemental LAW technologies appear to have sufficient merit to warrant further investigation, the team agreed that long-term waste form performance would be a critical determining factor due to the contaminants of concern (chemical and radiological). Similarly, the treatment processes deployed must result in wastes being compliant with Washington State Dangerous Waste requirements for treatment and disposal. The team recognizes that any waste form will have to undergo an intense waste form qualification process including testing to show compliance with the Land Disposal Restriction (LDR) requirements. This waste form performance will likely be an issue of concern to public and tribes.

c) Over two dozen technology candidates were screened. Of those, four technical approaches; sulfate removal, containerized grout, bulk vitrification, and steam reforming appear to warrant further consideration in the near term as potential LAW supplemental treatment technologies. All appear to offer a potential to reduce the time to complete LAW processing by as much as 15 – 20 years. Our

analysis of each technology included radionuclide separations prior to LAW feed treatment to meet As Low as Reasonably Achievable (ALARA) and waste disposal considerations. The team recognizes that a determination against the Department of Energy (DOE) Order 435.1 Waste Incidental to Reprocessing (WIR) requirements will be an issue requiring a high degree of scrutiny and coordination by the agencies – and will likely be an issue of concern to the public and the tribes.

Summary of treatment technologies warranting further development (in order of highest to lowest scoring):

(1) Sulfate Removal by acid-side strontium precipitation is recommended for consideration by ORP as a WTP enhancement to increase waste loading in glass. This relatively simple technology can enhance the waste loading in borosilicate glass produced in the WTP thus reducing the time to treat the waste.

(2) Containerized Grout can be tailored to immobilize numerous waste constituents and is relatively easy to deploy. Containerized grout results in substantially increased waste volumes (on the order of three to four times, relative to glass, for the fraction of waste that is grouted) and carries significant waste form performance issues with it. It also faces local controversy due to a previously failed program with the grout vaults.

(3) Bulk Vitrification in roll-off bin size containers may produce an aluminosilicate glass waste form allowing high waste loadings, good waste form performance, and diminished final waste volumes. Bulk vitrification would occur within a structure that provides containment, emission control, and protection from the weather.

(4) Steam Reforming may produce a sodium aluminosilicate mineral-like waste form with high waste loadings and potentially good waste form performance, but increased overall waste volumes due to a low specific gravity. Steam reforming would be deployed as an adjunct to the WTP to supplement LAW glass.

d) All potential technologies will face regulatory and policy challenges including:

Bulk vitrification and steam reforming operate at elevated temperatures, so will likely have Maximum Achievable Control Technology (MACT) standards invoked through Resource Conservation and Recovery Act (RCRA) Subpart X, and will face the same rigor of permitting as is required for the WTP.

Treatment technologies using grout would need to be tailored to overcome waste form performance issues regarding the retention of mobile long-lived radionuclides and some hazardous constituents such as nitrates and nitrites.

A number of the technologies are likely to generate an increased volume compared to a vitrified waste form and could therefore require a larger overall amount of land for disposal.

In addition, the team recognized that for any option there would be secondary waste stream issues and impacts to supporting facilities.

e) All four technologies require further bench or cold testing prior to committing to pilot-scale hot testing.

f) The team also found that active metal denitration appears to be a promising technology capable of producing a competent waste form (sodium aluminosilicate). It operates exothermically using the free energy in scrap aluminum. It has only been tested at bench-scale however, and needs further development to work out potential safety issues (e.g., gas generation) prior to pilot – or full-scale testing with hot materials. As such, further research/investigation is better pursued using alternative funding such as the DOE's Office of Science and Technology (EM-50) at present.

Conclusion: While there are no silver bullet supplemental technology candidates, i.e., all have some issues, the technologies (sulfate removal, containerized grout, bulk vitrification, and steam reforming recommended for Fiscal Year (FY) 2003 bench-scale or cold testing) hold the potential to substantially accelerate risk reduction and shorten the time to mission completion.

3) Path Forward Schedule and Recommendation

a) Recommend that ORP fund sulfate removal, containerized grout, bulk vitrification, and steam reforming on a limited scale in FY 2003 to obtain data needed to determine merit and likelihood of successful deployment. If warranted, then one or more of these technologies would result in pilot testing (FY 2005) and hot field deployment (between FY 2006 and 2008)

b) Continue a working group for tank waste treatment enhancements and supplemental technologies to the tank waste treatment plant.

4) Key Decision/Policy Issues Requiring Resolution

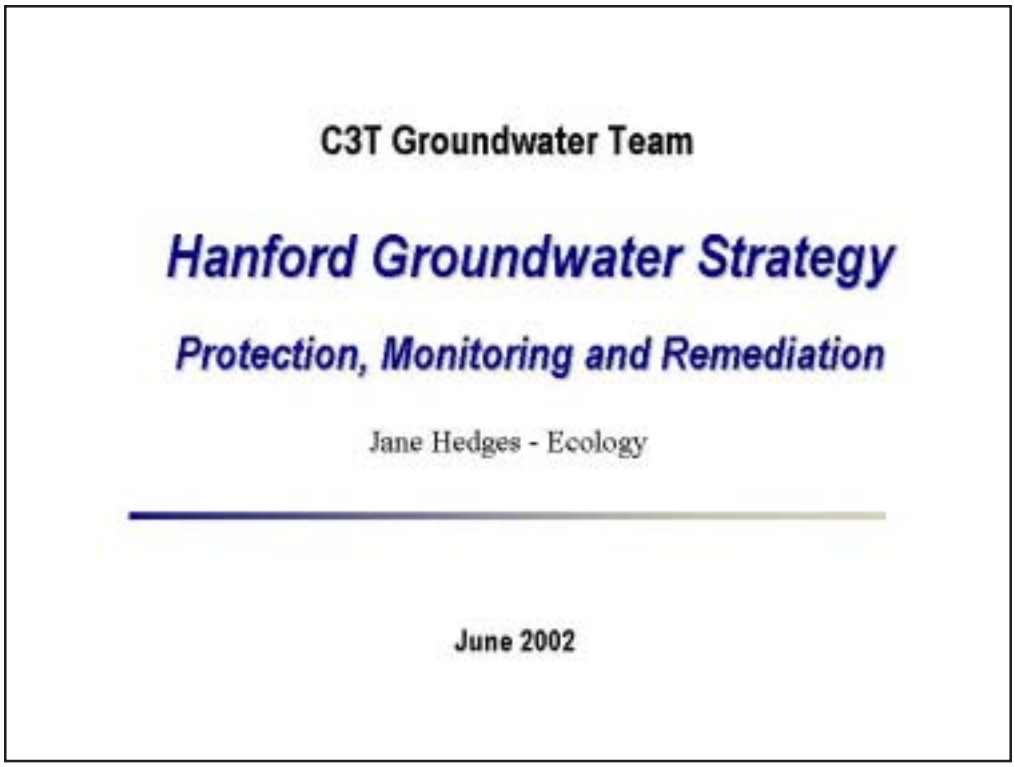
Recommend approval by agency executive management.

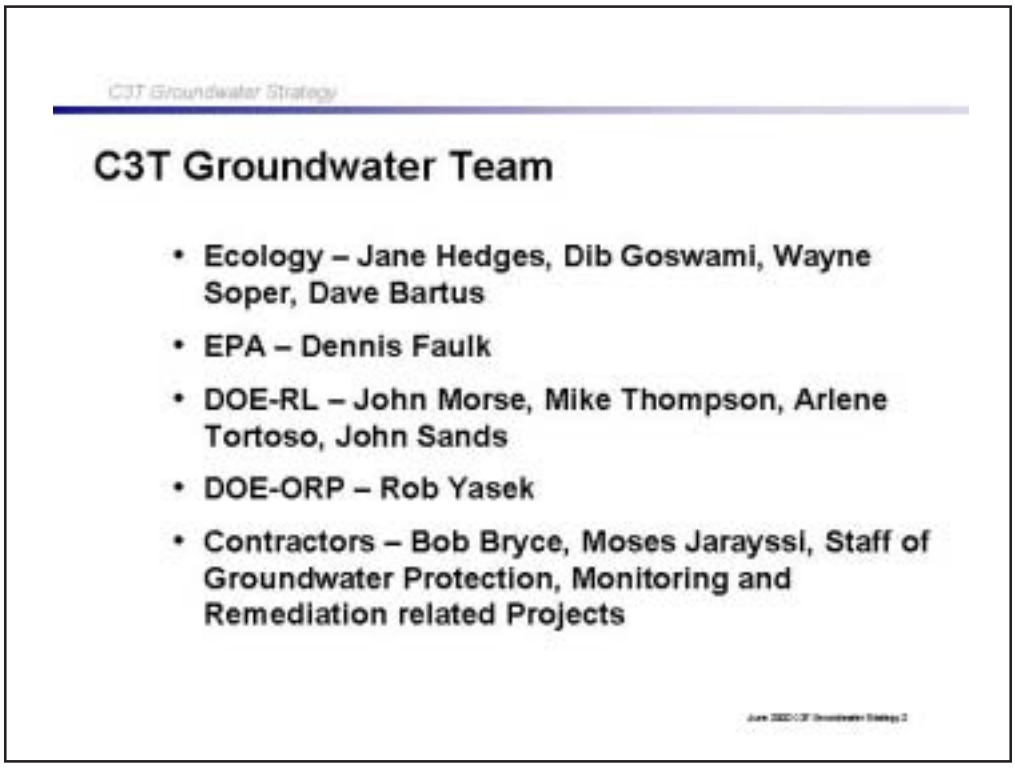
5) Potential Cost Savings from Implementation of the Opportunity

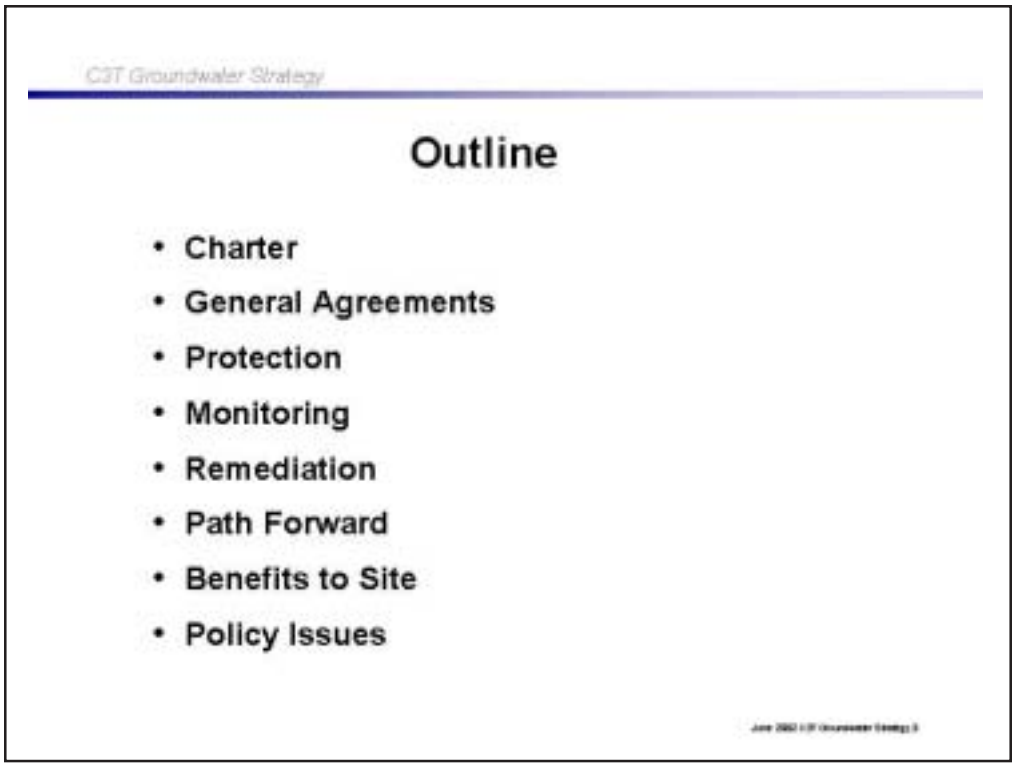
In examining the supplemental technologies, reduction in the length of time needed to complete tank waste treatment was used as a surrogate measure for life-cycle cost.

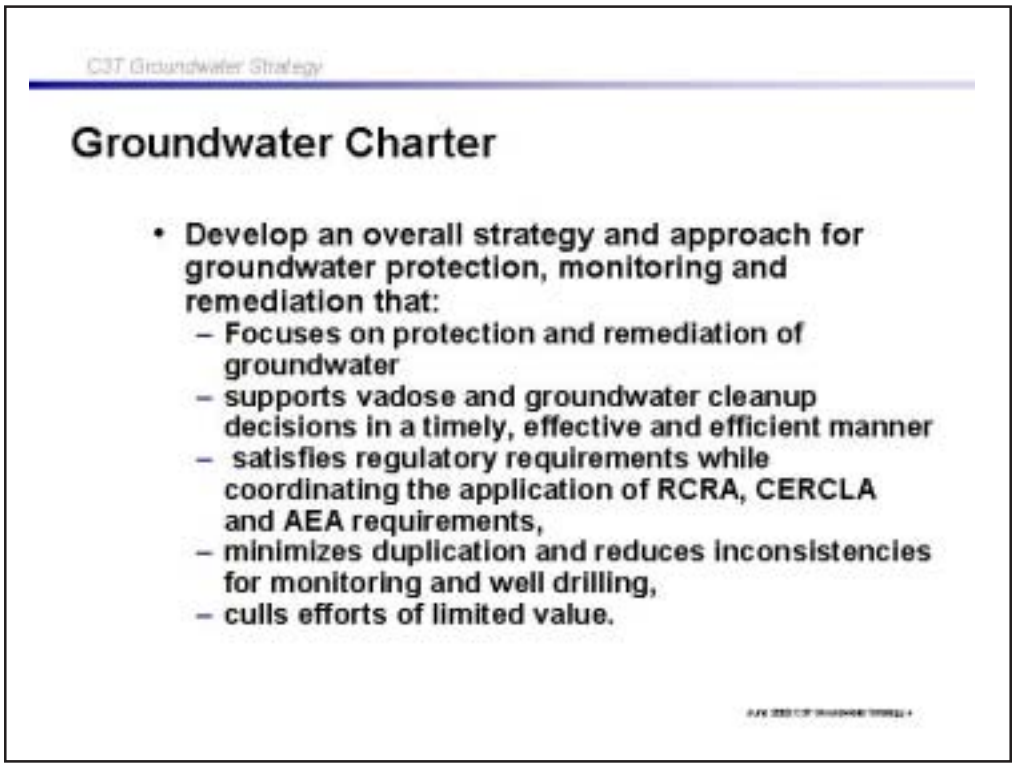
Appendix D—Hanford Site Groundwater Strategy

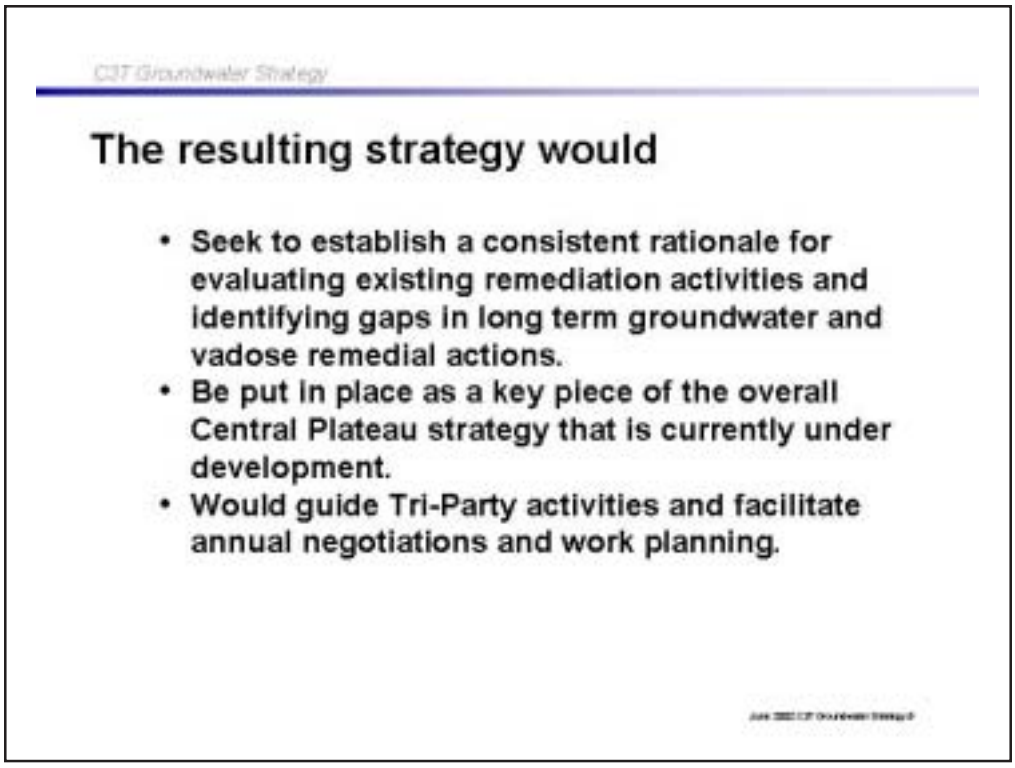
D.1 - Hanford Groundwater Strategy—Protection, Monitoring and Remediation Presentation

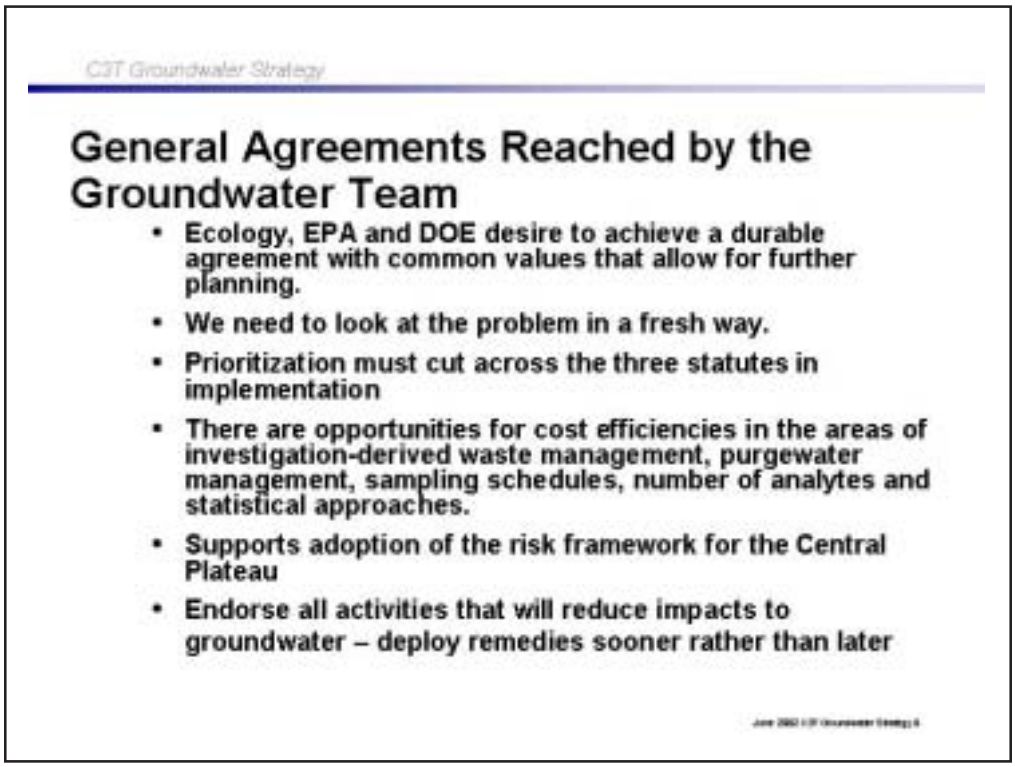





C3T Groundwater Strategy
Outline
• Charter
• General Agreements
• Protection
• Monitoring
• Remediation
• Path Forward
• Benefits to Site
• Policy Issues


C3T Groundwater Strategy
Groundwater Charter
• Develop an overall strategy and approach for groundwater protection, monitoring and remediation that:
– Focuses on protection and remediation of groundwater
– supports vadose and groundwater cleanup decisions in a timely, effective and efficient manner
– satisfies regulatory requirements while coordinating the application of RCRA, CERCLA and AEA requirements,
– minimizes duplication and reduces inconsistencies for monitoring and well drilling,
– culls efforts of limited value.


C3T Groundwater Strategy
The resulting strategy would
• Seek to establish a consistent rationale for evaluating existing remediation activities and identifying gaps in long term groundwater and vadose remedial actions.
• Be put in place as a key piece of the overall Central Plateau strategy that is currently under development.
• Would guide Tri-Party activities and facilitate annual negotiations and work planning.


C3T Groundwater Strategy
General Agreements Reached by the Groundwater Team
• Ecology, EPA and DOE desire to achieve a durable agreement with common values that allow for further planning.
• We need to look at the problem in a fresh way.
• Prioritization must cut across the three statutes in implementation
• There are opportunities for cost efficiencies in the areas of investigation-derived waste management, purgewater management, sampling schedules, number of analytes and statistical approaches.
• Supports adoption of the risk framework for the Central Plateau
• Endorse all activities that will reduce impacts to groundwater – deploy remedies sooner rather than later

C3T Groundwater Strategy

Groundwater Protection

Once groundwater becomes contaminated it is difficult and costly to remediate. Therefore, prevention of future groundwater contamination is the primary means of protecting groundwater. Hanford's strategy for protecting groundwater focuses on four areas

C3T Groundwater Strategy

Hanford's strategy for protecting groundwater focuses on four areas

- Properly operate waste storage, treatment and disposal facilities,
- Remove or immobilize contaminant sources where appropriate,
- Reduce natural and artificial recharge in contaminated areas,
- Properly decommission wells that are no longer needed.

C3T Groundwater Strategy

Proposed Accelerated Actions

- Accelerate placement of covers to reduce infiltration – Example: BC Cribs
- Eliminate leaking water lines near waste sites
- Decommission unnecessary wells in vicinity of waste sites

C3T Groundwater Strategy

Groundwater Monitoring

Contaminant concentrations in groundwater are monitored at Hanford to characterize existing groundwater contamination and to detect new arrivals of contaminants in groundwater so that appropriate facility operation and remediation decisions can be made.

C3T Groundwater Strategy

Monitoring is conducted to:

- detect groundwater impacts from operating and past practice waste sites,
- determine the nature and extent of groundwater contamination so that appropriate action can be taken,
- assess the effectiveness of groundwater remediation activities,
- verify that Hanford Site contaminants are not present in offsite groundwater.

C3T Groundwater Strategy

Agreements and Proposed Accelerated Actions

- Agreement: An integrated list of well drilling needs for the site is being developed through the DQO process. The M-24 milestone will be modified to be consistent with a single integrated list to support all regulatory needs.

C3T Groundwater Strategy

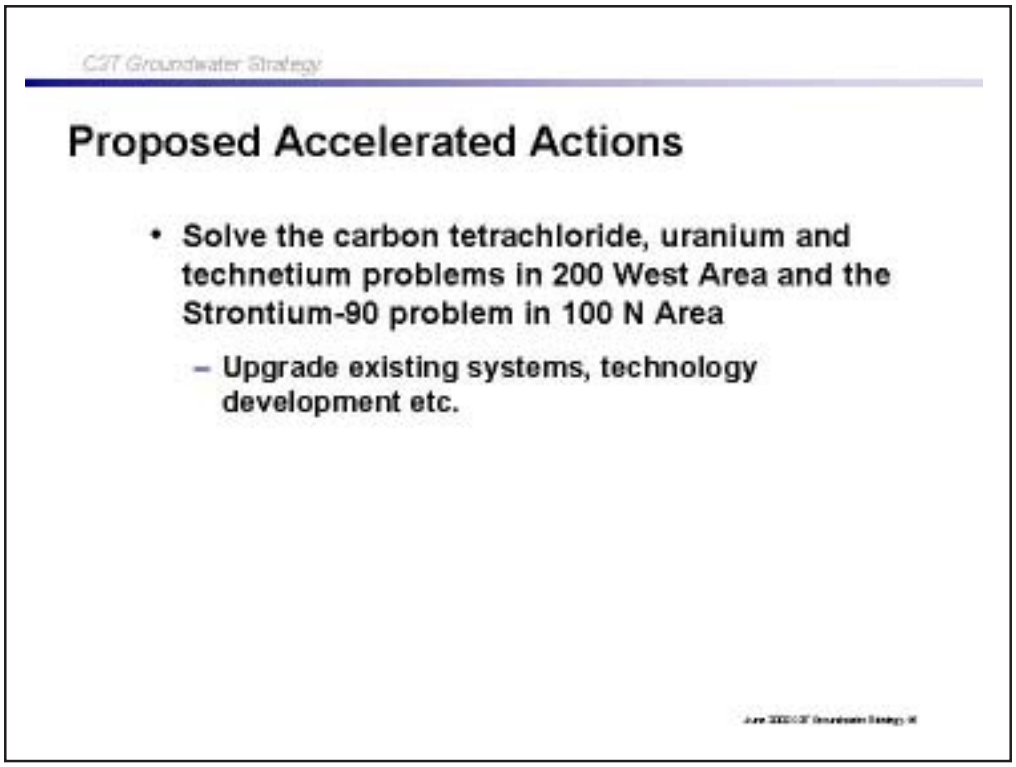
Groundwater Remediation

- The goal of groundwater remediation is to restore groundwater to its intended beneficial uses - protecting human health and the environment and protecting the Columbia River

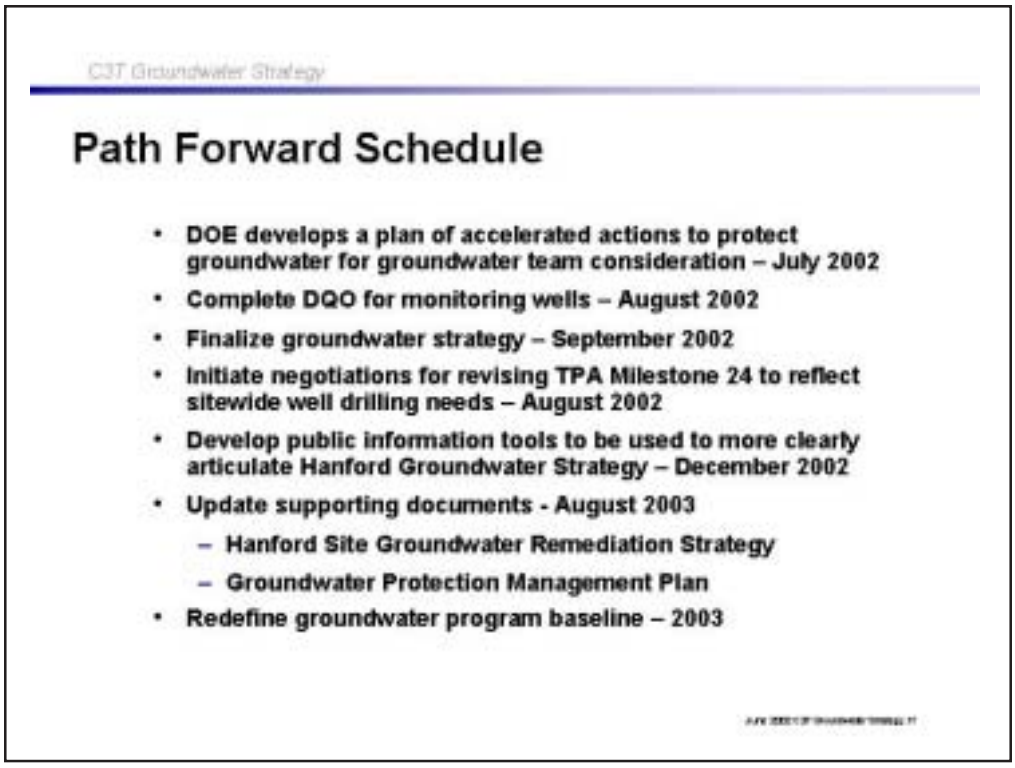
C3T Groundwater Strategy

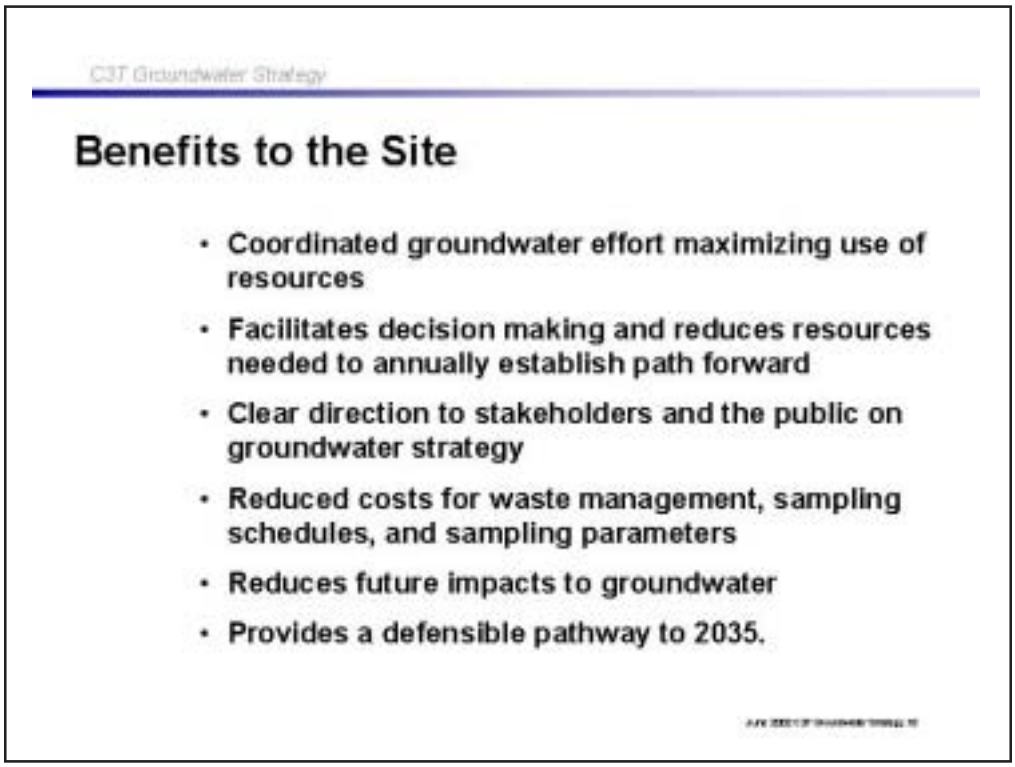
Key elements of the remediation strategy:

- Place a high priority on actions that protect the Columbia River and near-shore environment from degradation caused by the inflow of contaminated groundwater
- Control the migration of plumes that threaten or continue to further degrade groundwater quality beyond the boundaries of the Core Zone,
- Avoid recontamination of the sites undergoing groundwater remediation or further degradation from site operations,
- Develop and evaluate alternative remediation technologies where needed.


C3T Groundwater Strategy
Proposed Accelerated Actions
• Solve the carbon tetrachloride, uranium and technetium problems in 200 West Area and the Strontium-90 problem in 100 N Area
– Upgrade existing systems, technology development etc.


C3T Groundwater Strategy
Communication of groundwater plans and results
The C3T Groundwater Team recognizes the importance of communication the plans and results groundwater actions to the Tribal Nations, stakeholders and public.
Transparency and accessibility lead to credibility


C3T Groundwater Strategy
Path Forward Schedule
• DOE develops a plan of accelerated actions to protect groundwater for groundwater team consideration – July 2002
• Complete DQO for monitoring wells – August 2002
• Finalize groundwater strategy – September 2002
• Initiate negotiations for revising TPA Milestone 24 to reflect sitewide well drilling needs – August 2002
• Develop public information tools to be used to more clearly articulate Hanford Groundwater Strategy – December 2002
• Update supporting documents - August 2003
– Hanford Site Groundwater Remediation Strategy
– Groundwater Protection Management Plan
• Redefine groundwater program baseline – 2003


C3T Groundwater Strategy
Benefits to the Site
• Coordinated groundwater effort maximizing use of resources
• Facilitates decision making and reduces resources needed to annually establish path forward
• Clear direction to stakeholders and the public on groundwater strategy
• Reduced costs for waste management, sampling schedules, and sampling parameters
• Reduces future impacts to groundwater
• Provides a defensible pathway to 2035.

D.2 - Hanford Groundwater Strategy—Protection, Monitoring and Remediation Report

Hanford Site Groundwater Strategy

Protection, Monitoring, and Remediation

Prepared by C3T Groundwater Team

Hanford Site Groundwater Strategy

Protection, Monitoring, and Remediation

September 2002

Table of Contents

Figures

1.0 Mission

The mission of the Hanford Groundwater Protection Program is to protect the Columbia River from contaminated groundwater resulting from past, present, and future operations at the Hanford Site and to protect and restore groundwater to its highest beneficial use. This mission is a key element of the overall Hanford cleanup efforts. This document provides a strategy to accomplish the mission through groundwater protection, monitoring, and remediation. This is a strategy document only – specific groundwater decisions will be made through the appropriate regulatory process. Additionally, this document identifies how the information related to this strategy and its implementation will be made available to interested parties.

2.0 Vision

The fundamental goal of the U.S. Department of Energy's (DOE's) Groundwater Protection Program is to protect human health and the environment from Hanford contamination and is a key piece of DOE's overall Hanford cleanup strategy. To accomplish this goal, groundwater protection, monitoring, and remediation activities at Hanford:

- Satisfy regulatory requirements.
- Integrate Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Atomic Energy Act of 1954 (AEA) requirements.
- Minimize duplication and reduce inconsistencies for monitoring and well drilling.
- Support vadose and groundwater cleanup decisions in a timely, effective, and efficient manner.

The groundwater strategy provides a consistent rationale to evaluate protection, monitoring, and remediation activities and identify gaps in groundwater and vadose remedial actions. The strategy guides field activities conducted on the Hanford Site and facilitates annual negotiations between the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology) and DOE (Tri-Parties) and the related work planning. The Tri-Parties' goal is to implement a strategy that minimizes adverse effects to groundwater during site operations and cleanup.

3.0 Goals and Objectives

The goals and objectives of this groundwater strategy are to:

- Provide a clear mechanism to achieve the mission of the Hanford Groundwater Program through minimizing overlapping programmatic/regulatory requirements of RCRA, CERCLA, AEA, and the Model Toxics Control Act (WAC 173-340).

- Identify regulatory requirements and environmental objectives to protect, monitor, and remediate groundwater.
- Provide a framework that relates data needs to the decision making needed for remedial activities and monitoring.
- Develop a strategy that can be adapted as new information emerges.
- Identify and integrate policy issues that affect the Tri-Parties.
- Focus action on the reduction of risk; characterization, monitoring, and other activities should be done to support that end.
- Protect and remediate groundwater considering the cumulative impact of waste remaining at Hanford, regulatory requirements, and stakeholder values.
- Meet risk-based cleanup objectives through an appropriate combination of reduction of contaminant mass and containment of plumes to minimize the spread of contamination.
- Minimize further degradation of groundwater during remedial and closure activities (e.g., tank waste retrieval), including the reduction of preferential pathways (such as abandoned wells).

4.0 Regulatory Integration

Hanford groundwater protection, monitoring, and remediation actions are guided by both federal and Washington State regulations. The primary relevant acts are RCRA, CERCLA, and AEA.

4.1 RCRA Groundwater Activities

Groundwater monitoring at Hanford under RCRA requirements and the implementing regulations of the Washington Administrative Code (WAC) 173-303 focuses on several key areas:

- Verification of safe operation and management of currently active land-based waste management units (i.e., landfills and surface impoundments) that will protect groundwater.
- Verification of closure performance standards for clean up of groundwater and monitoring of groundwater for closed/closing land-based regulated units.
- Corrective action for solid waste management units (RCRA past-practice units identified in the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement, Ecology et al. 1998) Appendix C nomenclature.

In accordance with Tri-Party Agreement milestone M-20, all groundwater monitoring requirements will be included in the Hanford sitewide permit under authority of WAC 173-303-645 and WAC 173-303-646. Although not all RCRA units enumerated in Appendices B and C of the Tri-Party Agreement have been incorporated into the sitewide permit, this strategy is based on the long-term goal of

basing groundwater monitoring requirements on the final status and corrective action requirements cited in these WAC requirements.

Groundwater monitoring for active land-based units (i.e., landfills and surface impoundments) is conducted on a unit-specific basis to document that current waste management activities do not adversely affect groundwater. Groundwater monitoring for closed/closing land-based units may either be on a unit-specific basis or as part of a broader groundwater operable unit monitoring system. The monitoring approach selected for a particular waste management unit depends on a number of factors that include the source inventory of the waste management unit, the mobility and toxicity of waste or constituents in the waste management unit, similarity of contamination in the waste management unit and the associated groundwater operable unit, and the relative contribution of contamination from the waste management unit compared to the associated groundwater operable unit.

Groundwater monitoring for single-shell tanks is a complex, special case that is dealt with separately under Tri-Party Agreement milestones M-24 and M-45. Single-shell tanks are considered non compliant tank systems with documented releases to the environment, but which must continue to be used to manage waste for an extended period of time pending retrieval and closure. Groundwater moni-toring at the single-shell tanks supports numerous environmental and regulatory data needs, including evaluating the sources of groundwater and vadose contamination, the fate and transport of existing and potential future releases, the aquifer characteristics for purposes of evaluating retrieval technologies, and the long-term risk for purposes of developing closure performance standards and post-closure care requirements.

4.2 CERCLA Groundwater Activities

The Hanford Site has been divided into 56 operable units, or groupings of similar waste units within a geographic area, so that the CERCLA process established in the National Oil and Hazardous Substances Contingency Plan (40 CFR 300) can be efficiently implemented. Forty-six are source operable units and 10 are ground water operable units. Groundwater monitoring and related site characterization for operable units are treated separately to allow for differences between the more localized contaminants in the soil column at the sources and the more widespread distribution of ground-water contaminant plumes that have resulted from one or more individual sources. The concept of the groundwater operable unit was adopted to allow separate characterization of the source operable units and the groundwater. There are 10 groundwater operable units at the Hanford Site. Monitoring wells are located and sampled in accordance with Remedial Investigation/ Feasibility Study (RI/FS) work plans to define the nature and extent of the contaminant plume(s).

In developing a sitewide groundwater monitoring strategy, the Tri-Parties recognize the distinction between groundwater remediation and source remediation. Characterization and monitoring are essential elements of both. Also, the Tri-Parties recognize the distinction between active waste management units and waste sites undergoing cleanup.

EPA, DOE, and Ecology affirm Section 5.5 of the Tri-Party Agreement (Ecology et al. 1998), which recognizes the need to coordinate the application of regulatory requirements, and recognize that past-practice authority may provide the most efficient means to address groundwater plumes of mixed waste originating from a combination of past-practice treatment, storage, and disposal units. Ground-water response actions for which EPA is the lead regulatory agency shall ensure compliance with the technical requirements of RCW 70.105 and implementing regulations. Notwithstanding this operating assumption, Ecology reserves the right to exercise its authority under RCW 70.105 to require response actions specific to the treatment, storage, and disposal facilities.

4.3 Atomic Energy Act Groundwater Activities

Under the authority of AEA, DOE is required to implement a groundwater program at Hanford. Groundwater that is or could be affected by DOE activities shall be monitored to determine and document the effects of operations on groundwater quality and quantity and to demonstrate compliance with DOE requirements and applicable federal, state, and local laws and regulations. The plan shall identify all DOE requirements and regulations applicable to groundwater protection and include an appropriate monitoring strategy. The elements of the groundwater monitoring program shall be specified (sampling plan, sampling, analysis, and data management), as shall the rationale or purpose for selecting these elements. Groundwater monitoring programs shall be conducted on-site and in the vicinity of DOE facilities to:

(1) Obtain data for the purpose of determining baseline conditions of groundwater quality and quantity.

(2) Demonstrate compliance with and implementation of all applicable regulations and DOE Orders.

(3) Provide data to permit the early detection of groundwater pollution or contamination.

(4) Provide a reporting mechanism for detected groundwater pollution or contamination.

(5) Identify existing and potential groundwater contamination sources and to maintain surveillance of these sources.

(6) Provide data upon which decisions can be made concerning land disposal practices and the management and protection of groundwater resources.

Site-specific characteristics shall determine monitoring needs. Where appropriate, groundwater monitoring programs shall be designed and implemented in accordance with 40 CFR 264, Subpart F, or 40 CFR 265, Subpart F. For sites with multiple sources of groundwater pollutants, extensive groundwater pollution, or other unique site problems, groundwater monitoring programs could require more extensive information than those specified in 40 CFR 264 and 265. Monitoring for radionuclides shall be in accordance with DOE Orders in the 5400 series dealing with radiation protection of the public and the environment.

Additional regulatory analysis is provided in Appendix C of this document.

5.0 Strategies

This groundwater strategy focuses on three key areas:

- Groundwater protection.
- Groundwater monitoring.
- Remediation of contaminated groundwater.

Strategy elements for each of these areas are presented in the following sections. Each section also identifies areas for technology improvements and the role of groundwater modeling. Actions to be taken to communicate groundwater plans and the results of actions taken are discussed in Section 6.

5.1 Groundwater Protection

Once deep vadose zone and/or groundwater becomes contaminated it is difficult and costly to remediate. Therefore, prevention of future groundwater contamination and containment of existing near-surface contamination are the primary ways to protect groundwater. Key activities in preventing future groundwater contamination include operating and managing properly the existing and new land-based waste storage and disposal facilities, removing or immobilizing contaminant sources before contamina-tion can reach groundwater, reducing natural and artificial recharge in contaminated areas, and eliminat-ing the opportunity for contaminants to move rapidly to groundwater along unsealed well casings and through deteriorating wells that are no longer needed or used.

5.1.1 Groundwater Protection Framework

Operation of Waste Storage and Disposal Facilities. Permanent onsite disposal of waste is an integral component of the overall Hanford cleanup mission, including clean up and protection of ground-water. Consistent with the "cradle-to-grave" waste management model of RCRA and RCW 70.105, all aspects of managing this waste must be based on the principle of preventing human health or environmen-tal harm through proper waste management practices. Proper operation of active waste storage and disposal facilities is a key element to assure continued protection of groundwater. Avoiding new and/or preventing additional contamination from entering the groundwater from both new and existing opera-tions must become a primary objective in facility management. Design and operation of waste management units currently accepting RCRA regulated waste (including new or expanded units) must reflect the basic minimum technology (double liner, leak detection, etc.) and groundwater monitoring requirements of RCRA. More specifically, waste disposal units are fully subject to the traditional groundwater detection monitoring, compliance monitoring, and corrective action requirements of WAC 173-303-645.

Removal or Immobilization of Contaminant Sources. Removal of contaminant sources, immobilization of the waste, remediation of waste releases at the sources, and/or minimization of contaminant transport at the sources helps protect

groundwater by controlling the source of the contami-nants. Considerable progress has been made in the Columbia River corridor in this respect. Plans are being developed to accelerate the cleanup of the remaining sites in the river corridor, and accelerate cleanup of the core zone (Figure 1) including treating tank waste, remediating waste sites, and decommis-sioning excess facilities (DOE/RL 2002). Each of the actions taken in these areas will reduce the potential for degradation of groundwater quality.

Reducing Natural and Artificial Recharge in Contaminated Areas. Reducing natural and artificial recharge in contaminated areas protects groundwater by reducing the transport of contaminants through the vadose zone into the unconfined aquifer. Much has been done at the site to eliminate discharge of cooling and process water to ground. Work has begun to provide run-on/runoff control measures in and around tank farms, remove unnecessary water lines, and test necessary water lines to reduce recharge from precipitation and water line leaks.

Decommissioning Unnecessary Wells. There are many wells and borings that no longer serve a useful purpose on the Hanford Site. These wells and borings can provide an avenue to speed contamina-tion through the vadose zone to the unconfined aquifer and possibly deeper. These wells and borings fall into three broad categories:

- Wells that have gone dry due to the decline of the top of the unconfined aquifer.
- Older wells that are noncompliant.
- Wells that no longer serve an exploration, assessment, or regulatory purpose.

To aid in protecting the aquifer from mobile contamination, it is imperative that these wells and borings be removed. When it is determined that they are not necessary and/or will not or cannot be used, then they should be properly decommissioned. As part of the groundwater protection strategy, a priority ranking system will be developed to determine which wells pose the highest environmental risk and, therefore, should be decommissioned first.

Science and Technology. There is a long-term need for science and technology to support groundwater protection on the Hanford Site. Cost reduction and improved effectiveness of protection actions can be realized through continuing investments in these areas.

Modeling and Assessment to Support Groundwater Protection. As alternate disposal and remedial actions are considered, computer models are used to assess the cumulative risk and impact of materials left at the Hanford Site. For groundwater protection, models can be used to:

- Identify and rank sites according to those that pose a future threat to groundwater quality, (e.g., magnitude of flux of contaminant through the water table).
- Assist in the prioritization of waste sites for accelerated action (e.g., contribute the risk to public information to profiles of cost, schedule, worker risk and, therefore, develop comparisons of alternate actions).

The assessments performed with the help of models will complement the data collected on the performance of implemented disposal and remedial actions (e.g., from the 5-year reviews), and provide the final cumulative assessment of long-term risk and impact prior to Hanford Site closure.

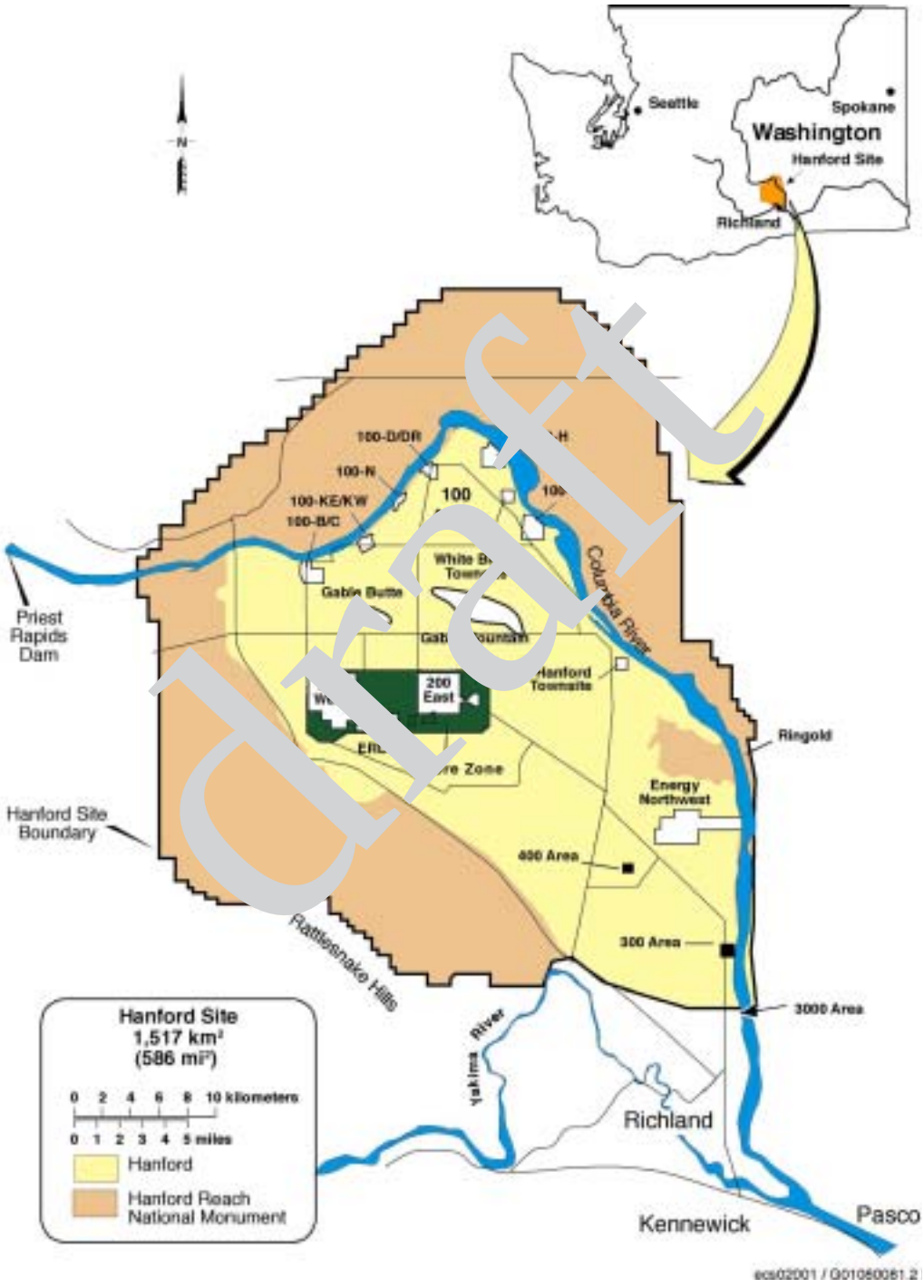


Figure 1. Location of key features on theHanford Site

5.1.2 Considerations for Near-Term Action

DOE will continue to operate Hanford waste treatment, storage and disposal facilities in accordance with permits and applicable regulations. Waste sites will be reviewed to identify sites that warrant accelerated removal of the source. Sites also will be reviewed to identify opportunities to reduce recharge and transport of contaminants into groundwater through placement of interim covers and run-on/runoff control measures. This effort will focus on sites with significant inventory of long-lived, mobile radionuclides and chemicals where there is an opportunity to slow or delay the release of this material to the groundwater.

The water supply and disposal infrastructure in the core zone (see Figure 1) also will be examined to identify actions that can be taken to reduce influx of water near waste sites. This may include the cutting and capping of water lines and reduction of sanitary sewer disposal in the vicinity of waste sites. In addition, unused wells in areas where they continue to offer a potential pathway for contaminants to reach groundwater will be given a high priority for decommissioning.

Technology development will continue to help characterize where contaminants are and how they are moving as well as identify improved methods for remediation. Improved characterization of carbon tetrachloride distribution and movement in the vadose zone is needed in the near term to prepare for making remediation decisions. Improved technologies for removing or immobilizing waste in the vadose zone and preventing its entry into the groundwater and the Columbia River will continue to be important. The Science and Technology Roadmap (DOE/RL 2000) will continue to be used to link the needs of cleanup projects to science and technology investigations.

5.1.3 Considerations for Final Protection Efforts

The character of waste in tanks at Hanford remains key to protecting groundwater beneath the site. An important component of this groundwater strategy is the development of tank retrieval technologies that will limit the loss of tank waste during retrieval operations.

For many past-practice waste sites in the Central Plateau that have long-lived contaminants that are already deep in the vadose zone, the placement of covers or barriers over the site may be the only practicable action to reduce the movement of contaminants and delay their entry into groundwater. Continued research into effective methods to immobilize or remove these contaminants should be pursued. Examples of improved technology identified in the Science and Technology Roadmap (DOE/RL 2000) are six-phase heating to remediate carbon tetrachloride in the vadose zone and work to improve the performance of waste site covers.

5.2 Groundwater Monitoring

Groundwater monitoring is conducted to:

- Detect effects to groundwater from operating and past practice waste sites.
- Determine the nature and extent of groundwater contamination so that appropriate action can be taken.
- Assess the effectiveness of groundwater remediation activities.

- Verify that Hanford Site contaminants are not present in offsite groundwater.
- Determine hydraulic head to determine groundwater flow rate and direction.

5.2.1 Groundwater Monitoring Framework

Groundwater monitoring will be performed to support cleanup decisions and to verify that land- based disposal units are properly designed and operated to prevent impact to groundwater. Groundwater monitoring needs are defined principally by regulatory requirements of RCRA (including the technical requirements pertinent to Model Toxics Control Act (WAC 173-340) standards), CERCLA and AEA and directly support agreed-upon cleanup goals. Once these monitoring needs are defined, an enforceable regulatory pathway and/or decision document under RCRA or CERCLA can be developed. Where cleanup-driven requirements do not naturally match regulatory requirements, there should be a bias toward interpretation and application of regulations that best support cleanup goals. Ultimately, of course, monitoring requirements must demonstrate compliance with applicable rules, regulations, and the Tri-Party Agreement (Ecology et al. 1998). Once developed, requirements must be reflected in enforceable decision documents.

The EPA's data quality objectives (DQO) process was successfully used to integrate the RCRA, CERCLA, and AEA groundwater monitoring requirements in the 200 West Area, and will be used as a model for the remaining groundwater regions. The DQO process is a seven-step decision making process that requires the user to clearly:

- Define the problem needing to be resolved
- Identify the decisions that need to be made
- Identify the inputs needed to resolve the decisions
- Define the boundaries of the study area
- Identify decision rules
- Define tolerable limits on decision error
- Identify the optimum sampling design

The success of the DQO process for 200 West Area had much to do with DOE, EPA, and Ecology being encouraged to provide input prior to beginning the DQO process, as well as throughout the process. For example, DOE, EPA, and Ecology were interviewed separately prior to beginning the DQO process to identify specific issues and concerns that they wanted taken into consideration in the final sampling design. This input was used to develop a pre-draft "strawman" DQO Summary Report. A separate meeting was held with DOE, EPA, and Ecology to introduce them to the "strawman" DQO Summary Report, and to get their preliminary feedback. This feedback was integrated into the document to develop the Draft DQO Summary Report, which was issued for comprehensive review.

Once contamination is detected, monitoring and related activities are undertaken to assess the nature and extent of groundwater contamination so that appropriate action can be taken. Appropriate action may vary depending on the risk associated with the contamination as indicated by the mass of contaminant involved, its mobility and persistence in the environment, and its toxicity.

The following strategy provides a common, sitewide perspective to guide the development of assessment activities for individual groundwater operable units and, when appropriate, groups of waste sites. Guiding principles are developed within the context of existing groundwater conditions, the regulatory framework for remediation, and stakeholder values. These principles for a comprehensive groundwater assessment approach are summarized below:

- When a new plume/contamination is discovered within an existing plume, assessment of the new plume/contamination should be incorporated into the ongoing assessment of the existing plume as long as the cleanup goals/objectives of both are the same. For other plumes, assessment actions will be undertaken once contaminant concentrations are detected in groundwater above an agreed to threshold. Whenever possible, predictions of future conditions with reliable estimates or known inventory information will be used as a tool to locate future monitoring wells and determine future monitoring requirements.
- Monitoring and characterization of waste sites will use a graded approach, focusing resources on sites that have a large inventory of long-lived and mobile contaminants. Groundwater monitoring and characterization of contaminant plumes also will use a graded approach, focusing resources on plumes that may pose a threat to the Columbia River or groundwater. The vast majority of such contamination occurs in the 200 Areas. First priority will be given to waste sites and groundwater contaminant plumes (e.g., carbon tetrachloride, single-shell tanks, specific retention trenches and cribs that received tank waste) that have a known or suspected inventory of long-lived and mobile contaminants sufficient to pose a threat to the Columbia River or to affect groundwater resources outside of the 200 Areas core zone. The three groundwater plumes associated with the PUREX Plant operations (tritium, nitrate, and iodine-129) are expected to attenuate through natural processes. These plumes do not currently pose a risk to human health or the environment and risk from these plumes is not expected to increase in the future. It is the goal of this strategy to prevent 200 Area contaminants from recontaminating the aquifer outside of the 200 Area core zone. Attainment of this goal also will assure protection of the Columbia River and its users.
- For monitoring needs of single-shell tank waste management areas refer to Appendix C of this document.
- When practicable vadose zone monitoring will be considered to allow the early detection of contamination before it reaches groundwater.
- If contamination from a facility is detected, an evaluation will be performed to identify what needs to be done to correct the problem.
- Predictions of future conditions will be used to establish the thresholds for triggering assessments and identify the mass of contaminant that constitutes a threat to groundwater degradation.

Waste sites contributing to groundwater contamination in the core zone are likely to impact existing, partially or well-defined plumes. Assessment of existing and new sources should be undertaken in a phased manner. The first screening phase should evaluate whether the source area is likely to significantly impact the

underlying plume, or whether the new source contribution is within the capability of any remediation system in place. Criteria might include:

- Mass flux from source areas compared to the mass and distribution of contaminants in the underlying plume.
- Contaminants in the source area compared to the underlying plume (chemical nature, mobility).
- Capability of any containment/remediation system to accommodate releases from the source area.

If results of the first phase of investigation indicate that (1) the source area is not a significant contributor to the underlying plume or (2) any releases from the source area can be effectively addressed by existing remediation systems, then further assessment/characterization is not warranted at that site.

If results of the first phase of investigation indicate that (1) the source area is a potentially significant contributor to contamination or (2) modifications to the remediation system at the source area might be needed, then additional characterization is warranted to determine what additional remediation might be necessary. A generalized decision logic for this process is provided in Figure 2.

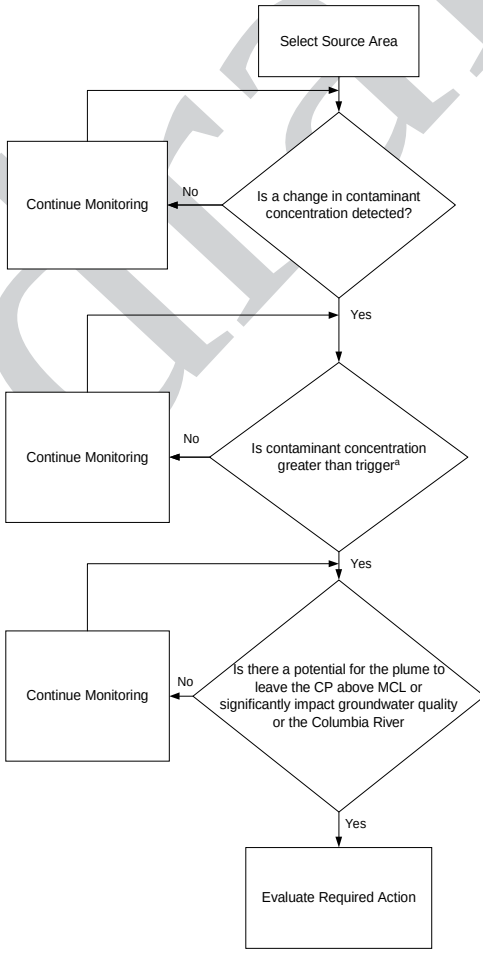


Figure 2. Generalized decision logic for assessment and remediation of groundwater

Land-based RCRA-regulated units that currently accept or actively manage waste are a special case. For these units, the principal monitoring goal is to demonstrate that the engineered unit is performing satisfactorily and providing releases to the environment, rather than provide information to be used in the cleanup of past releases or existing plumes. Further, there is less flexibility in implementing Subpart F WAC 173-303-645 proscriptive groundwater monitoring requirements compared to monitoring associated with cleanup. Even within this context, the groundwater monitoring points should be evaluated to best serve the requirements of disposal unit monitoring and groundwater plume cleanup. This includes monitoring points near potential leaks from tanks undergoing waste retrieval.

Groundwater monitoring is described in more detail in the environmental monitoring plan developed for Hanford (DOE/RL 1997).

Science and Technology. There is a need for continued technology development to support groundwater monitoring. Technologies that will provide improved information at lower cost can be used during the active cleanup phase and could greatly reduce the cost of long-term stewardship. Advances will not be possible without continuing investments in science and technology.

Modeling and Assessment to Support Groundwater Monitoring. Computer modeling has long been used to assist in designing networks of groundwater monitoring wells. Models used have included complex, sitewide groundwater models to help identify where and when contaminants might reach the point of compliance or point of concern so that monitoring wells can be located with the best chance of detecting the first arrival of contamination and of monitoring the movement of any plumes. Computer models also have included the aquifer hydraulic model, (i.e., providing predictions of water-table elevation), that is used to identify wells that require deepening or replacement because of water-level change in response to changed water disposal practices on the core zone. As cleanup proceeds, modeling will continue to assist in the identification of monitoring well locations that are needed to detect and monitor plumes and to reduce uncertainty in the area between wells where measurements are not available.

5.2.2 Considerations for Near-Term Action

Hanford currently has an extensive groundwater monitoring program with results reported each year, most recently in *Hanford Site Groundwater Monitoring For Fiscal Year 2001* (Hartman et al. 2002). A number of near-term actions have been identified to improve the integration of monitoring performed to meet a number of site needs. Those actions include:

- Carry out the data quality objectives process for the core zone to coordinate and possibly integrate RCRA, CERCLA and AEA requirements.
- Examine decision road map for core zone to identify additional information needs that require monitoring.
- Develop a prioritized rolling three-year schedule for monitoring well installation.
- Establish a process to review and update the monitoring program.

5.2.3 Considerations for Final Monitoring Efforts

As the cleanup continues to reduce the potential for waste sites and site operations to affect groundwater, the Tri-Parties will continue to implement the process developed to review and update the groundwater monitoring program. Once protective measures and remedial actions are completed, contamination may be left in the vadose zone and the groundwater at levels that potentially exceed standards for protection of public health and the environment. Therefore, as these actions are completed, adequate monitoring must continue, not only of the groundwater and vadose zone, but also for the soundness of physical barriers and institutional controls that continue into the future.

5.3 Groundwater Remediation

The goal of groundwater remediation is to restore groundwater to its intended beneficial uses to protect human health, the environment, and the Columbia River. This strategy provides a common, sitewide perspective to guide the development of remediation activities for individual operable units. Guiding principles are developed within the context of existing groundwater conditions, the institutional and regulatory framework for remediation, and stakeholder values. These principles for a comprehensive groundwater remediation approach are summarized below.

5.3.1 Groundwater Remediation Framework

Characterization. The necessary characterization will be carried out to better understand the hydrogeology, contaminant behavior/chemistry, sub-surface conceptual model, contaminant inventory and its nature and extent, and to design and assess remedial actions where ever appropriate. Modeling results will be validated with actual field data. The field site will provide an opportunity to test advanced characterization tools and methods, identify mechanisms and processes that control the depth and extent of contaminant plumes in the Hanford Site vadose zone, and calibrate and refine predictive transport model.

As new information is obtained, estimates of actual or potential exposure and the associated effect on human health and the environmental may be refined throughout the remedial investigation. Therefore, site characterization activities will be fully integrated with the development and evaluation of alternatives in the feasibility study/remediation effort.

Risk Assessment. Remedial alternatives/goals shall establish acceptable exposure levels that protect human health and the environment. These alternatives shall be developed as called for under applicable and appropriate requirements in federal and state laws. Risk assessment will follow the standard protocol set for different site-use scenarios. Detailed assessment would include a number of site-specific land-use scenarios ranging from unrestricted, agricultural, tribal, and restricted scenarios such as industrial use. The assessment also would include quantification of the cumulative health and environmental effects of Hanford contaminants on ecology, human health, culture, and economy of the area. The goal is to meet the cleanup levels for highest possible beneficial use of groundwater through remediation and other appropriate measures.

Science and Technology. There is a long-term need for science and technology to support groundwater remediation on the Hanford Site. In some cases existing technologies are prohibitively expensive for long-term use and in other cases the knowledge and technology needed to address the problem does not yet exist.

Modeling and Assessment to Support Groundwater Remediation. Predictions of future movement of contaminants in groundwater play an important role in prioritizing, planning and evaluating the effectiveness of remediation actions. Models of the vadose zone and groundwater for individual waste sites are used to plan barrier location and size as well as design pump-and-treat systems and other remedies. Models representing multiple waste sites are used to help identify locations (e.g., B/C cribs and trenches, each tank within an individual tank farm, or multiple tank farms within an operational area, like all within 200 West Area) where active remediation will achieve the greatest benefit. Models used will be validated against real data to insure accuracy.

The remediation strategy is a geographic and plume-specific approach to groundwater remediation. It is oriented to reflect public and tribal values and priorities. The following are key elements of this strategy:

- Place a high priority on actions that protect the Columbia River and near-shore environment from groundwater degradation caused by the inflow of contaminated groundwater.
- Reduce the contamination entering the groundwater from existing sources.
- Control the migration of plumes that threaten or continue to further degrade groundwater quality beyond the boundaries of the core zone.
- Avoid recontamination of the sites undergoing groundwater remediation or further groundwater degradation from site operations.
- Develop a Hanford Site process to establish alternate concentration limits.

5.3.2 Initial Remediation Efforts

Groundwater remediation efforts are underway on the Hanford Site. These efforts:

- Maintain a bias toward field remediation activities by employing the Hanford Past Practice Strategy (Thompson 1991) to accelerate interim remedial actions.
- Continue implementation of accelerated groundwater remediation projects to control plume expansion, reduce contaminant mass, and better characterize aquifer response to remedial actions.
- Develop and evaluate alternative remediation technologies.

A number of characterization and assessment actions are underway at the Hanford Site to provide important data to evaluate and support remediation decisions. These actions will be completed prior to initiating any new actions in the same study area. Evaluation and update of existing groundwater remediation actions will continue under past-practice authority using interim records of decision that may be modified to accommodate new remediation technologies and characterization needs. Ongoing characterization actions for tank farms (supporting the field investigation

reports) will be completed prior to revising the monitoring/assessment well networks for the corresponding waste management area.

Continued technology development is needed to identify alternate, more effective remediation techniques for existing groundwater contaminant plumes. Techniques to remove, remediate, and/or immobilize chromium, uranium, and technetium-99 in the vadose zone before reaching groundwater; reduce costs for existing remediation technologies; and characterization to understand natural degradation of carbon tetrachloride are examples of near-term science and technology needs. The science and technology roadmap (DOE/RL 2000) will continue to be used to link cleanup project needs to science and technology investigations.

5.3.3 Final Remediation Efforts

Succeeding phases of remedial actions are oriented toward identifying and implementing the final records of decision, which in turn will satisfy broader cleanup objectives, such as:

- Achieve applicable relevant and appropriate requirements with respect to the value of current and potential future beneficial uses for the groundwater resource.
- Develop alternative containment and remediation strategies if currently available groundwater restoration technologies prove inadequate or impracticable.
- Restore groundwater outside the core zone for unrestricted use, as soon as technically possible.
- Remediate groundwater in the river corridor with the focus on protecting human health and the environment.
- Prevent further degradation of groundwater quality beyond the boundaries of the core zone, and ultimately restore unrestricted use of groundwater beyond that boundary.
- Implement process to establish alternate concentration limits (ACLs) where required.

5.3.4 Resource Optimization

An important element in the groundwater remediation strategy is optimizing the use of available resources. The following are key considerations:

- Balance the sequencing and scale of remedial actions to achieve efficient use of resources.
- Incorporate existing and/or proposed treatment and disposal infrastructure.
- Implement currently available technology and foster demonstrations of developing technology for meeting remediation objectives.
- Improve the integration of the existing groundwater monitoring networks and sampling schedules, to better characterize the contamination problem and to measure the effectiveness of remediation efforts.

- Obtain information necessary to make decisions and speed up remediation of groundwater.
- Review DOE Orders to ensure they are relevant to the cleanup mission.

5.3.5 Remediation of Emerging Groundwater Plumes

EPA, DOE, and Ecology recognize the need to coordinate the application of regulatory require-ments, and that past-practice authority may provide the most efficient means to address mixed-waste groundwater contamination plumes originating from a combination of treatment, storage, and disposal units and past-practice units. There is a need to coordinate remedial actions, whenever feasible, at CERCLA operable units with adjacent operable units, with RCRA facilities undergoing closure, and with state-permitted waste discharge facilities. Groundwater response actions for which EPA is the lead regulatory agency shall assure compliance with the technical requirements of RCW 70.105. Notwith-standing this operating assumption, Ecology reserves the right to exercise its authority under RCW 70.105 to require groundwater remedial actions specific to the treatment, storage, and disposal units.

6.0 Implementation

This document presents the general strategy for groundwater protection, monitoring, and remediation. There are two key aspects to implementing this strategy: (1) technical and regulatory documents outlining the details of specific groundwater protection, monitoring, and remediation actions and (2) communication of plans and results to Tribal governments, stakeholders and the public.

6.1 Implementing Documents

This document identifies the high-level strategies for groundwater protection, monitoring, and remediation for the Hanford Site. As such, this document is not intended to provide specific groundwater protection, monitoring, or remediation details, nor is it intended to be legally binding on the Tri-Parties. Specific actions necessary to implement these high-level strategies will be carried out through individual legally-binding decision documents and several subordinate policy-level documents.

The Tri-Party Agreement (Ecology et al. 1998) is the primary legal document that provides schedules and requirements to achieve compliance with applicable regulatory requirements and to clean up the Hanford site. Generally, the Tri-Party Agreement relies on program-specific decision documents, such as the RCRA site-wide permit and CERCLA decision documents (including 5-year reviews of records of decisions) to develop and approve work necessary to implement this strategy and satisfy regulatory requirements. In other instances, such as where waste

management units cannot operate in compliance with applicable regulatory standards (for example, single-shell tanks), the Tri-Party Agreement defines schedules of specific actions necessary to achieve compliance and mitigate the effects of non-compliant activities. In all cases, specific requirements that implement this groundwater strategy will be subject to public notice and comment according to the program-specific administrative approval requirements associated with each decision document or the Tri-Party Agreement.

The following strategy/plan documents provide additional strategy, policy or procedures that relate to the overall strategy of this document:

- The groundwater remediation strategy (DOE/RL 1995)
- The annual project planning process carried out each year.
- Groundwater monitoring plans (e.g., *FY 2002 Integrated Monitoring Plan for the Hanford Groundwater Monitoring Project*, PNNL-13698).
- The *Hanford Site Groundwater Monitoring Setting, Sources and Methods* (Hartman 1999)
- Hanford Site groundwater monitoring reports (e.g., *Hanford Site Groundwater Monitoring for Fiscal Year 2001*, Hartman et al. [2002])
- A Central Plateau wide study of the vadose zone to provide guidance on when vadose zone monitoring is appropriate.

It is the intent of the Tri-Parties that the strategies set forth in this document and the various supporting strategy/policy documents enumerated above be reflected in final enforceable decision documents and Tri-Party Agreement milestones and requirements. The Tri-Parties further anticipate that the strategy and planning documents enumerated above be updated as necessary to be consistent with this strategy document.

6.2 Communication of Plans, Progress, and Results

The Tri-Parties recognize the importance of communicating the plans and results of groundwater actions to Tribal governments, stakeholders and the public. Transparency and accessibility lead to more effective public participation in protecting, monitoring, and remediating Hanford groundwater. Improved understanding of the issues, challenges, and options will lead to better decisions and to credibility for the agencies responsible for making those decisions.

The communication strategy that will be implemented to support these goals will involve the use of a diverse range of activities and products to provide information to and elicit input from these organizations and individuals about Hanford groundwater actions. Examples of communication mechanisms that may be used are regular public meetings, internet-accessible information, articles in general and technical publications, electronic newsletters, and informational compact discs. Specific detailed communication planning is underway.

7.0 Review and Evaluate

This strategy will be reviewed annually to determine if it remains consistent with long-range goals of the Tri-Parties. Appendices that include detailed protection, monitoring, and remediation actions will not be updated. These details will be updated as annual work plans are developed.

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Groundwater Strategy
Appendix A

Completed, Baseline, and Accelerated Actions that Implement the Groundwater Strategy

Appendix A

Completed, Baseline and Accelerated Actions that Implement the Groundwater Strategy

This appendix summarizes completed work, actions included in baseline plans, and accelerated actions included in the *Performance Management Plan for Accelerated Cleanup of the Hanford Site* (DOE/RL 2002). The accelerated actions most closely related to groundwater protection, monitoring, and remediation are initiatives 5 and 6. In addition, several accelerated actions have been identified for Science and Technology development. Table A.1 provides a crosswalk between the groundwater strategy elements and elements of the *Performance Management Plan for Accelerated Cleanup of the Hanford Site* (DOE/RL 2002).

The actions that implement the groundwater strategy have been organized into three broad categories for the purpose of managing the work. Those categories include: groundwater protection, groundwater monitoring, and groundwater remediation.

Table A.1. Groundwater Strategy Links to Performance Management Plan for Accelerated Cleanup (DOE/RL 2002)

	Groundwater Strategy Element	Performance Management Plan for Accelerated Actions Initiative Element
Groundwater Protection	Operation of waste storage and disposal facilities	
	Removal or immobilization of contaminant sources	Initiative 5 - U-Plant regional closure Initiative 6 - Shrink the footprint Initiative 6 - High risk waste sites
	Reducing natural and artificial recharge in contaminated areas	Initiative 6 - Reduce infiltration at existing waste sites Initiative 6 - Repair of leaking water lines Initiative 6 - Elimination of U Plant septic system discharge
	Decommissioning unnecessary wells	Initiative 6 - Decommissioning of wells
Groundwater Monitoring	Detect groundwater impacts from operating and past practice waste sites Determine the nature and extent of groundwater contamination so that appropriate action can be taken Assess the effectiveness of groundwater remediation activities Verify that Hanford Site contaminants are not present in offsite groundwater	Initiative 6 - Installation of wells to create an integrated sufficient monitoring well network within three years
Groundwater Remediation	Initial remediation efforts Final remediation efforts	Initiative 6 - Accelerate actions to get final remediations in place

A.1 Groundwater Protection

The elements of groundwater protection discussed in this appendix are:

- Operation of waste management and disposal facilities
- Managing surface water
  - — Run-on control
  - — Well abandonment
  - — Elimination of leaking water lines
  - — Discontinue use of septic tanks in the vicinity of waste sites
- Waste site remediation
- Monitoring

A.1.1 Operation of Waste Storage and Disposal Facilities

A number of facilities are operated at Hanford to store and dispose of waste generated in the past as part of Hanford operations and currently through the activities underway to clean up the site. Hanford's Waste Management Project operates the following facilities at Hanford:

- Central Waste Complex—to store waste.
- Waste Receiving and Processing Facility—to examine and evaluate transuranic and low-level waste and prepare transuranic waste for shipment to the Waste Isolation Pilot Plant in New Mexico.
- T Plant—to decontaminate and prepare K-Basin sludge.
- Waste Encapsulation and Storage Facility—to store cesium and strontium capsules underwater.
- Liquid Effluent Facilities (242-A Evaporator, Liquid Effluent Retention Facility, Effluent Treatment Facility, Treated Effluent Disposal Facility)—to treat and dispose of liquid effluents.
- Burial grounds—to dispose of solid waste.

Facilities are operated by the Waste Management Project to protect the environment. Protection is provided by:

- Facility design, such as liners and leachate collection systems on appropriate facilities and monitoring systems to guard against leakage.
- Waste acceptance criteria that limits what waste can be accepted for treatment, storage, or disposal.
- Performance assessment documentation that analyzes the behavior of disposed waste on the environment, including groundwater.

- Facility operating permits (Resource Conservation and Recovery Act of 1976 [RCRA], Clean Air Act [CAA], Clean Water Act [CWA]) that specify operating and other conditions that protect the environment.
- Procedures, including those for facility operation as well as response to conditions such as spills.

In addition, the Environmental Restoration Disposal Facility is operated at Hanford to receive and isolate low-level radioactive, hazardous, and mixed waste. It is authorized by the U.S. Environmental Protection Agency (EPA) to receive only waste from Hanford cleanup activities. The Environmental Restoration Disposal Facility is located in the center of the Hanford Site between the 200 East and 200 West Areas. The Environmental Restoration Disposal Facility is a large-scale, evolving landfill, complete with ancillary facilities. The facility is a RCRA-compliant landfill that is authorized under Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The facility also complies with all appropriate requirements, including Washington State Department of Ecology (Ecology), EPA and U.S. Department of Energy (DOE) codes, orders, standards and regulations. The Environmental Restoration Disposal Facility is designed to provide disposal capacity, as needed, to accommodate projected Hanford waste volumes over the next 20 to 30 years.

Four disposal cells make up the Environmental Restoration Disposal Facility. The first two cells are each 70 feet deep, 500 feet long and 750 feet wide. Construction of two additional cells was completed in 2000. An interim cover was placed over the filled portions of the first two cells. Design and construction of the final cover will not begin until cells #3 and #4 are filled. The Environmental Restoration Disposal Facility can be expanded further if necessary. Capacity of the current four-cell configuration is ten million tons. The cells are lined with a RCRA Subtitle C-type liner and have a leachate collection system. The facility is monitored regularly and when closed will continue to be monitored to ensure that human health and the environment are protected.

A.1.2 Managing Surface Water

This activity implements the strategy element “Reducing Natural and Artificial Recharge.”

Infiltration of water to the vadose zone provides the driving force for downward migration of contaminants in the vadose zone at the Hanford Site. Water in the vadose zone may come from such things as natural precipitation, waste water disposed to cribs, leaks from tanks, leaking water lines, septic tanks, and drain fields.

Efforts to reduce recharge started in earnest in 1987, as plans were developed to discontinue disposal of liquid waste streams to the soil. Over the next 2 years, the number of liquid waste streams was drastically reduced, and waste streams containing radioactive contaminants were routed through the 200 Area treatment facility in compliance with the Tri-Party Agreement milestone M-17 (Ecology et al. 1998). Cooling water discharge to ponds and ditches also was reduced and eventually eliminated on the Central Plateau as the decommissioning of PUREX was completed and other processes were shut down. These actions have nearly eliminated the disposal of wastewater on the Central Plateau. The focus of baseline

and accelerated actions are on eliminating the inadvertent and natural recharge to further protect Hanford's groundwater.

In 1998, DOE's Office of River Protection initiated a program to reduce natural and artificial recharge in and around tank farms to reduce the potential for contaminants in the vadose zone to be carried to groundwater. The program has four major components:

- Design and construct surface water run-on control measures upgradient of single shell tank farms.
- Abandon leaking pressurized water lines adjacent to single-shell tank farms.
- Upgrade monitoring drywells at single-shell tanks to include leak tight caps.
- Install surface cover for stabilization purposes.

Actions to reduce natural and artificial recharge were completed during fiscal year 2001 for 200 West Area tank farms. Actions for 200 East Area tank farms will be completed in 2002. The installation of prototype surface barriers to stabilize tank farm surfaces is planned for 2003.

Accelerated actions to reduce infiltration are proposed in the *Performance Management Plan for Accelerated Cleanup of the Hanford Site* (DOE/RL 2002) under Initiative 6 and include four key actions:

- Reduce infiltration at existing waste sites.
- Decommission wells.
- Repair leaking water lines.
- Eliminate U Plant septic system discharge.

Actions to be taken to reduce infiltration at existing waste sites will be similar to the actions being completed in and around tank farms. Berms will be constructed to prevent surface water from flowing onto waste sites, and areas around waste sites will be graded to allow snowmelt and other precipitation to run off the sites rather than infiltrate. This action can be completed by the end of 2005.

Wells that do not meet regulatory standards for construction will be eliminated to reduce the potential for them to act as a pathway for contaminated water to reach the groundwater. Ninety-nine wells were decommissioned during fiscal year 2001. Well decommissioning is not currently in the Hanford baseline; however, an accelerated action has been proposed to decommission high-risk wells by 2006 and the remaining wells by 2018.

Accelerated actions related to the treatment of Hanford's water lines has several components. It includes eliminating water lines near waste sites when possible and testing them to ensure they are not leaking when they cannot be eliminated. In addition, the site water supply system pumps will be changed to reduce water line pressure so that leaks are less likely to occur and less water will be lost if they do.

Septic systems continue to be used in the 200 Areas. One of those, the U Plant septic system, is located near radioactive waste disposal facilities that were used in the past. Under Initiative 6 of the performance management plan, discharge

to this system will be eliminated by September of 2004. Other systems will be evaluated and any further actions will be identified by September 2004.

A.1.3 Waste Site Remediation

This activity implements the strategy element "Removal and Immobilization of Contaminant Sources." During the past 7 years the Environmental Restoration Contractor has cleanup up 237 waste sites to regulatory standards. A total of 3.2 million tons of contaminated material has been removed from sites near the Columbia River and 1.4 billion gallons of contaminated groundwater have been pumped from the ground and treated. In the process, all liquid waste disposal sites in the 100-D and 100-H Area were backfilled, and the highly contaminated 116-N-3 crib was demolished and the material disposed of.

Baseline plans for waste sites along the Columbia River are to complete remediation by 2012 through the River Closure contract.

Remediation of Central Plateau waste sites and other sites not included in the River Closure Contract is planned for completion by 2026. This baseline plan is substantially accelerated through the actions proposed in the Performance Management Plan for Accelerated Cleanup of the Hanford Site.

Accelerated actions proposed in the performance management plan for DOE/RL (2002) under Initiative 5 include developing a plan to optimize the timing and sequencing for disposition of excess facilities and remediation of waste sites that pose the highest threat to groundwater by May 2003, and implementation of the U Plant record of decision by December 2003. Remediation of U Plant waste sites, demolition of the canyon facility, and installation of covers would be completed by September 2011. A plan also will be developed for the proposed disposition of the remaining four canyons by September 2008.

Initiative 6 proposes to accelerate the remediation of high-risk waste sites including the BC cribs and trenches that contain a significant inventory of technetium-99 (over 600 Curies), the Plutonium Finishing Plant cribs that contain plutonium and carbon tetrachloride, and the PUREX cribs that received iodine-129 which has impacted groundwater. The primary remediation to be applied to these sites is the installation of surface barriers to reduce the infiltration of water that drives contaminants through the soil to the groundwater. Barriers will be constructed to specifications jointly established with the regulatory agencies. In some cases, barriers will be applied to sites as they are; in others, waste materials may need to be removed, treated, and disposed of. Accelerated actions on these high-risk waste sites are scheduled for completion by 2010.

Initiative 6 also proposes to accelerate the remediation of several waste sites that reside outside the Central Plateau so that the Hanford Site outside the Central Plateau can be released for other uses as soon as possible. This includes remediation of Gable Mountain Pond, B-Pond, 200 North and several landfills. All waste sites outside the core zone with the exception of the 618-10 and 618-11 burial grounds are

scheduled for remediation by the end of 2012 instead of 2026, as is the current baseline.

A.2 Groundwater Monitoring

DOE has monitored groundwater on the Hanford Site since the 1940s to help determine what chemical and radiological contaminants have made their way to groundwater and how they have migrated in groundwater. As regulatory requirements for monitoring increased in the 1980s, there began to be some overlap between various programs. DOE established the Hanford Groundwater Monitoring Project in 1996 to ensure protection of the public and the environment while improving the efficiency of monitoring activities. The project addresses all groundwater monitoring needs at the site, eliminates program redundancy, and allows for cost-effective groundwater monitoring activities.

The Hanford Groundwater Monitoring Project provides groundwater monitoring, assessment, and reporting to meet the requirements of RCRA, CERCLA and the Atomic Energy Act of 1954 as implemented by DOE Orders. The Groundwater Protection Program provides the groundwater monitoring, assessment, and reporting for groundwater operable units where active groundwater remediation is ongoing. −The program provides an integrated, site wide assessment of groundwater quality and impacts from waste-disposal facilities operated by DOE and its contractors.

Both the unconfined and upper-confined aquifers are monitored and data are maintained and managed in a centralized database. Monitoring well locations, frequencies, and analytical constituents are documented each year. Sampling and analysis is coordinated among all data users, and results are evaluated to describe the areal extent and temporal trends of contamination. Results and conclusions are reported in a quarterly electronic report for RCRA facilities and are described in detail in an annual groundwater monitoring report for the entire site that meets all objectives and regulatory requirements. Results are summarized in the Hanford Site environmental report (Poston et al. 2002).

Water-level monitoring is performed to characterize groundwater flow and to determine the impact of Hanford Site operations on the flow system. The unconfined aquifer has been characterized in the past to construct and update a three-dimensional conceptual model for the unconfined aquifer. This conceptual model forms the basis for a numerical flow and transport model that has been constructed and used to predict impacts of site operations on groundwater flow and groundwater quality. These predictions are used to assess potential impacts and offsite migration.

Groundwater monitoring remains a part of the Hanford baseline throughout the cleanup mission at the site and will remain a component of long-term stewardship after remediation is completed.

One aspect of the groundwater monitoring program included in the performance management plan (DOE/RL 2002) is the installation of wells to create an integrated sufficient monitoring well network within three years. During 2002, a team of Ecology, EPA, DOE, and contractor staff participated in a data quality objectives process to identify the additional wells needed to adequately monitor the

Central Plateau. That process identified a number of wells that along with those already in existence would satisfy the regulatory requirements of CERCLA, RCRA, and the Atomic Energy Act of 1954. Installation of 200 West Area wells by can be completed by October 2003, 200 East Area wells by October 2004, and other needed wells in the Central Plateau by October 2005.

A.3 Groundwater Remediation

Groundwater remediation is underway at a number of locations on the Hanford Site. Records of decision call for active pump-and-treat systems at some locations and active monitoring of the attenuation of contaminant plumes that occur naturally at others where these processes are anticipated to be sufficient or where active remediation technologies are not available. These actions are briefly described below.

100-HR-3 and 100-KR-4 Operable Units. Groundwater beneath the 100-D, 100-H, and 100-K Areas was determined to represent an imminent risk to aquatic life in the Columbia River. An interim action to control the release of hexavalent chromium to the river through seeps and springs was initiated. This action was to install and operate a pump-and-treat system to reduce the concentration of chromium in the aquifer. These plumes as well as many of the seeps and springs exceed the aquatic water quality criteria. The remedial actions for these actions are based on the aquatic water quality criteria with an appropriate dilution factor for the interaction between the ground and surface waters based on extensive sampling within the seeps and springs.

An amendment to the decision for the 100-HR-3 Operable Unit was issued to deploy an alternative to pump-and-treat using a permeable barrier to chemically reduce the toxic chromium to a less toxic form. Installation of this barrier the 100-D Area will be completed in 2002.

100-NR-2 Operable Unit. Interim actions were taken to control the release of strontium-90 to the Columbia River in the 100-N Area. Although the actions taken were to address imminent risk, the remedial objectives for this action appear to be more along the lines of containment and mass reduction. No aquatic water quality criteria standards exist for Strontium-90, but concentrations entering the river exceed drinking water standards by more than 1,000 times.

Efforts are underway between DOE and Ecology to move this action to a more containment-based remedy using a sorptive barrier. Source control actions are nearly complete, but it is likely deep vadose zone contamination will necessitate restricted use for the final action.

200-UP-1 and 200-ZP-1 Operable Units. Containment and mass reduction interim actions are underway to limit future degradation of groundwater outside the boundaries of the Central Plateau due to uranium and technetium-99 from 200-UP-1 Operable Units and from carbon tetrachloride contamination from the 200-ZP-1 Operable Units. Pump-and-treat systems were initiated in these locations due to the

elevated concentrations of these contaminants in the groundwater and the massive inventory of these substances that remain unaccounted for in the vadose zone.

While interim remedial actions are underway at these sites, Initiative 6 proposes accelerated actions to get final remedies in place as soon as possible. This involves completing field investigations at the 200West Area carbon tetrachloride site by June 2004 so that the information is available to make a final decision. Alternative remedial technologies, such as phytoremediation, for strontium-90 at 100 N Area will be evaluated and deployed if appropriate by January 2006, and an apatite barrier will be deployed at 100 N springs if appropriate by October 2007.

A.4 Science and Technology

The Hanford Science and Technology Project was initiated in 1998 as part of the Groundwater/Vadose Zone Integration Project with the goal of coordinating and performing scientific research to support decision making for remediation activities at Hanford. The Science and Technology Project is now part of the Groundwater Protection Program at the Hanford Site and consists of focused, site-specific investigations funded by DOE Richland Operations.

The Science and Technology Project uses the process of road mapping, where problem holders (such as the DOE, Tribal Nations, regulators, stakeholders, and remediation contractors) come together with problem solvers (such as scientists and engineers from universities and the DOE national laboratories) to define the problems and establish a path to solution. The scope and outcomes of Science and Technology activities, linkages of outcomes to the Groundwater Protection Program or other Hanford Site projects, and the schedule, budget, and priorities for these activities are documented in the Science and Technology roadmap, which was issued and revised twice (DOE 1999; DOE 2000). The Science and Technology Project, and specifically the roadmap, was reviewed during FY00 and FY01 by a National Academy of Sciences/National Research Council committee, which issued a report on their findings (NRC 2001).

Major accomplishments of the Science and Technology Project to date include:

- Completing development of the soil inventory model to derive waste inventories and uncertainties for contaminated soil sites in the 200 Areas, used in the sitewide assessment with the System Assessment Capability.
- Incorporating research results from the Science and Technology Project and EMSP directly into the Field Investigation Report for the S-SX Tank Farm, a Tri-Party Agreement mandated milestone dealing with tank farm corrective actions (RPP 2002). Work is now underway focused on investigations of the B-BX-BY tank farm.
- Completing field experiments in the 200 East Area with dilute and saline solutions and tracers, showing that subtle changes in sediment texture can induce lateral spreading of moisture plumes and contaminants in the vadose zone (Gee and Ward 2001).
- Completing development of conceptual and numerical models of the groundwater/river interface at 100-H Area and other reactor areas.

- Completing biological fate and transport experiments involving technetium-99 uptake in fish and an aquatic plant.

The Science and Technology roadmap is currently undergoing revision to reflect accomplishments to date, comments by the National Academy of Sciences committee, and to add the soil and groundwater remediation technical element. Activities in the roadmap are linked to the performance management plan's (DOE/RL 2002) Initiative 5 for Central Plateau regional closures and Initiative 6 for groundwater protection. The groundwater protection activities include scientific investigations and technology development to upgrade current groundwater pump and treat systems operating at the site. Future revisions of the roadmap will reflect additional accomplishments, changes in the site baseline, and will include the monitoring technical element.

Activities proposed for FY03 through FY05 as part of the Groundwater Protection Program, DOE EM-50, and EMSP include:

- Complete development and application of the soil inventory model to estimate inventories for past practice soil waste sites to support sitewide assessments.
- Perform vadose zone moisture and water flux measurements to support U Plant regional closure and other groundwater protection measures.
- Complete uranium reactive transport field experiment and data analysis, including scaling of modeling parameters.
- Complete laboratory and modeling studies for T-TX-TY Tank Farm and remedial design at environmental restoration sites PW-1, TW-2, and CW-5 and initiate studies for A/AX, C, and/or U tank farms; integrate EMSP studies of uranium and strontium-90.
- Complete carbon tetrachloride laboratory studies and model development (Groundwater Protection Program), complete carbon tetrachloride characterization and remediation acceleration project (DOE EM-50) and integrate carbon tetrachloride retention and release and in situ remediation studies (EMSP).
- Complete biological fate and transport studies of strontium-90 and uranium and initiate iodine-129 studies to support sitewide assessments and remedial decisions.
- Perform remediation technology development studies to address phytoremediation and apatite sequestration of strontium-90 (Hanford Site Strategic Initiative 6), bioremediation of technetium-99 and chromium (DOE Natural and Accelerated Bioremediation Research Program), carbon tetrachloride in the vadose zone and groundwater, and surface barrier development.

Accelerated sections proposed in performance management plan (DOE/RL 2002) include committing EM-50 or incremental additional site funding for science and technology initiatives required to support remedial decisions for the 618-10 and 618-11 burial grounds by October 2002. Accelerated actions also were identified to commit EM-50 or incremental additional site funding for science and technology initiatives required to support remedial decisions for the 200-ZP-1 Operable Unit (carbon tetrachloride) and initiatives required to support remedial decisions for 100-N

Springs. The additional funding for these two activities is to be committed by October 30, 2002.

A.5 References

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Groundwater Strategy
Appendix B

Decisions Related to Groundwater Remediation

Appendix B

Decisions Related to Groundwater Remediation

The following tables identify the decisions related to groundwater remediation that need to be made for each area on the Hanford Site. The tables also include the date each decision must be made, the information needed to make the decision, and any pertinent comments.

Table B.1. 100 Area Decisions

Location	Decision	Date	Information Needs	Comment
100-N Area	Interim groundwater decision	2004	Evaluate remediation alternatives and strontium - 90 impact on river receptors - currently 2004, could be expedited to 2003 to support groundwater decision.	Source removal (DOE baseline) not expected to protect groundwater.
100-B/C Area	Groundwater Remediation	2007	Contaminant concentrations in groundwater after source removal complete.	Natural attenuation or active remedial action.
100-F Area	Groundwater Remediation	2009	Contaminant concentrations in groundwater after source removal complete.	Natural attenuation or active remedial action.
100-H Area	Groundwater Remediation	2010	Contaminant concentrations in groundwater after source removal complete.	Natural attenuation or active remedial action, Need to consider 183-H solar evaporation basins in decision.
100-D Area	Groundwater Remediation	2012	Contaminant concentrations in groundwater after source removal complete.	Natural attenuation or active remedial action.
100-K Area	Groundwater Remediation	2013	Contaminant concentrations in groundwater after source removal complete.	Natural attenuation or active remedial action.

Table B.2. 200 East Area Decisions

Location	Decision	Date	Information Needs	Comment
PO-1	Final remediation	2026	Impact of source removal of PO-1 area	
	Near term actions	2003	Monitoring Plan	The **RFI/CMS** is drafted, need to resolve the RCRA/ CERCLA policy issue and then use this document to set up monitoring system until final decision in 2005 tank farm investigation of soil to be completed, 2007 ORP to complete FIRs
BP-5	Monitoring Plans	2007	Field Investigation Reports (FIRs) for Tank Farms	
		2003	Monitoring Plan	Active investigation complete for major plumes
	Final remediation	2026	Impact of source removal in BP-5 area	

Table B.3. 200 West Area Decisions

Location	Decision	Date	Information Needs	Comment
200-W				
UP-1	Modification of remediation approach	2005	Focused Feasibility Study, Alternate remedial technologies for uranium, Remedial action report	MSE Technologies is developing a geochemical model for uranium in the vadose zone and groundwater at UP 1. The model will be developed in FY 2002, 2003 and a final report is scheduled for FY 2004. The geochemical model will facilitate the evaluation of alternate remedial technologies for uranium
			Alternate remedial technologies for uranium	
			Remedial action report	
	Decide if we have met goals and what the next steps are	2006	Inventory and information from above listed studies	Evaluate how well goals have been met, evaluate technical improvement, evaluate practicability
			Liquid effluent treatment capacity	If Waste Treatment Plant takes all the Effluent Treatment Facility capacity may need to build new facility
ZP-1	Decide on path forward with selected remedy	2008	RI/FS, Source information	Invest money now to evaluate our system
		2005	RI/FS work plan	
		2006	Source identification completed	

Table B.4. 300 Area and 1100 Area Decisions

Location	Decision	Date	Information Needs	Comment
300 Area	Interim groundwater decision	2006	Need to determine impacts (ecological) of uranium on river	Next 5 year review is critical
	Monitored Natural Attenuation	2006	MNA re-evaluation	Monitored Natural Attenuation (MNA) was selected as the interim action remedy prior to 1999 DOE guidance on MNA and EPA OSWER Directive 9200 4-17P
1100 Area	Decide to stop monitoring	2006	Monitoring results remain below MCL	

Groundwater Strategy
Appendix C

Additional Regulatory Background Information: Role of RCRA Corrective Action for Groundwater

Appendix C

Additional Regulatory Background Information: Role of RCRA Corrective Action for Groundwater

The Resource Conservation and Recovery Act (RCRA) and Washington State Dangerous Waste Programs have two key corrective action programs relating to clean up of releases to the environment. The first, and more traditional, relates to releases to groundwater from land-based "regulated units," defined as landfills, land treatment units, and surface impoundments. This program element, which is an integral part of required groundwater monitoring under 40 CFR 264, Subpart F and WAC 173-303-645, is limited to releases to groundwater from these specific types of units. This authority does not apply to other types of units or to releases to any other environmental media. In re-authorizing RCRA in 1984 through the Hazardous and Solid Waste Act amendments, Congress added the second corrective action program element, now more broadly known as the RCRA corrective action program. This authority has several notable elements. First, it is statutorily required of all permitted facilities to protect human health and the environment. Second, it applies to solid waste management units, a scope well beyond the limited applicability of 40 CFR 264, Subpart F groundwater corrective action. Third, it applies to releases to all media, not just releases to groundwater. Finally, it may be satisfied by specific permit conditions or by schedules of compliance where necessary work cannot be completed by the time of issuance of the permit.

How do these two corrective action program elements relate to one another? Generally, releases to groundwater from "regulated units" (in the 40 CFR 264, Subpart F context) must be addressed through the groundwater monitoring requirements of Subpart F and WAC 173-303-645. Because these types of releases are most closely associated with the waste management component of RCRA, the choice between the applicable Subpart F and the Hazardous and Solid Waste Act corrective action requirements is strongly biased to the preventative waste management standards of 40 CFR 264, Subpart F. The one key exception to this interpretation is land-based units that are closed or closing and subject to post-closure care requirements. In this instance, the groundwater monitoring requirements of 40 CFR 264, Subpart F and WAC 173-303-645 may be replaced with equally protective requirements developed through the Hazardous and Solid Waste Act corrective action process.

Under terms of the Hanford Tri-Party Agreement (Ecology et al. 1998), cleanup responsibilities are allocated to the authorities of RCRA and CERCLA, and oversight by the U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology. In a number of instances, both agencies and both programs have jurisdiction over the same waste management unit. A specific example is a solid waste management unit subject to corrective action under WAC 173-303-646, and under the cleanup authorities of CERCLA. The clear intent of both the Tri-Party

Agreement and the sitewide permit is to minimize duplication and overlap of regulatory activities while assuring full compliance with applicable requirements.

Where particular corrective action conditions under the authority of WAC 173-303-646 are not explicitly included in the sitewide permit (either condition II.Y.3 or Part IV), permit condition II.Y.2 addresses this question of overlapping jurisdiction. Generally, this condition recognizes and accepts as potentially satisfying the corrective action requirements of WAC 173-303-646 work completed (including schedules of compliance) under the Tri-Party Agreement for both CERCLA and RCRA past-practice units. This condition requires the permittee to comply with the terms and schedules in the Tri-Party Agreement for each of these units. Permit conditions II.Y.2.a and II.Y.2.b accomplish this end by including Tri-Party Agreement requirements and schedules applicable to CERCLA and RCRA past-practice units into the sitewide permit by reference, including amendments to the Tri-Party Agreement after the effective date of these permit conditions. As documents developed and approved under the Tri-Party Agreement, CERCLA records of decision also are included in this provision as documents developed and approved under the Tri-Party Agreement. In this way, the permit explicitly exercises and satisfies the corrective action requirements of WAC 173-303-646 while fully meeting the objective of minimizing or elimination duplication and overlap between programs and agencies. In no way does this mechanism waive or provide any relief from any applicable RCRA or CERCLA requirement.

Permit condition II.Y.2.c also recognizes the overlap between the RCRA closure/postclosure requirements and corrective actions. This condition allows the permittee to satisfy applicable corrective action requirements through the closure/post-closure care process. Although both EPA and Ecology policy and guidance acknowledge that closure and corrective action should achieve similar environmental outcomes, this condition anticipates that the RCRA closure process should be principle regulatory mechanism for dealing with environmental releases at the time of unit closure.

C.1 Summary of Unit Classifications at Hanford

Units at Hanford subject to groundwater monitoring requirements can be divided into several general classes. The first includes land-based units currently operating and receiving regulated dangerous/mixed waste. For these units, the primary regulatory focus is the preventative waste management component of RCRA, specifically the traditional detection/compliance monitoring and groundwater corrective action requirements of WAC 173-303-645. Presently, units in this class include the mixed waste trenches 31 & 34, the Liquid Effluent Retention Basins , and through the CERCLA program, the Environmental Restoration Disposal Facility. These units all have, or are scheduled to receive, RCRA operating permits (or CERCLA authorization in the case of the Environmental Restoration Disposal Facility). As waste management units, this class of regulated units is expected to be well designed, constructed, and operated to prevent releases to the environment, including groundwater, that require cleanup.

The second class includes closed/closing land-based units that are identified as RCRA treatment, storage, and disposal units in Appendix B of the Tri-Party Agreement (Ecology et al. 1998), but are no longer actively receiving regulated

waste. This class of units includes traditional landfills or burial grounds, as well as other units like cribs or trenches. These units are scheduled to begin the closure/post-closure process and will not receive RCRA operating permits. These units also are subject to the traditional groundwater monitoring requirements of WAC 173-303-645, but may also be eligible for provisions that allow groundwater and closure requirements to be developed through the corrective action process under the authority of WAC 173-303-645(1)(e). When this regulatory provision can be applied,[(a)] it is possible to satisfy applicable RCRA regulatory requirements for the regulated unit through equally protective requirements developed under CERCLA authority.

The third class of units includes single-shell tanks. Single-shell tanks are not regulated as land-based units under WAC 173-303-645 (see specifically the definition of "regulated unit" in WAC 173-303-040), although contaminated soil associated with single-shell tanks may require closure as a landfill under the tank closure requirements of WAC 173-303-640(8)(b). Rather, single-shell tanks are non-compliant tank systems that cannot receive operating permits for storage of dangerous/mixed waste. As such, these units are addressed by compliance requirements and schedules of Tri-Party Agreement milestone M-45, including retrieval of waste, and the development and implementation of closure plans[(b)]. Due to the special regulatory status of single-shell tanks , all groundwater monitoring and response actions should be within the integrated, long-term management approach set forth in Tri-Party Agreement milestones M-45 and the associated monitoring requirements of M-24.

The final class of units are RCRA and CERCLA past-practice units scheduled under the Tri-Party Agreement Appendix C to be addressed under the CERCLA or RCRA corrective action process. RCRA and CERCLA achieve similar environmental endpoints with respect to protecting groundwater. Therefore, it may be appropriate for corrective action decisions at RCRA past-practice units to defer the groundwater component of a cleanup to a CERCLA operable unit, or to accept work conducted under CERCLA authority as satisfying RCRA corrective action requirements. This latter mechanism is fully developed as part of RCRA sitewide permit condition II.Y.2.

C.2 Single-Shell Tank Site Characterization and Monitoring

Single-shell tanks are non-compliant tank systems that, for many technical reasons, cannot be removed from service at this time. Tri-Party Agreement milestones associated with single-shell tanks provide a schedule of compliance for these tanks, including specific measures such as groundwater monitoring requirements that are necessary to minimize the environmental harm of continued

(a) Other applicability criteria include (1) a demonstration that the regulated unit is situated among other solid waste management units or areas of concern, (2) a release has occurred, and (3) both the regulated unit and one or more of the solid waste management units or areas of concern are likely to have contributed to the release. In addition, it is necessary to apply the traditional groundwater monitoring and closure requirements in order to protect human health and the environment. See specifically WAC 173-303-645(e)(i) and (ii).

(b) Formal approval of closure plans will be under the permit modification authority of WAC 173-303-800, pursuant to requirements of the TPA Action Plan [reference?] Section 5.3.

management of waste in single-shell tanks and to build the necessary technical database to support retrieval and closure. The single-shell tanks are addressed by compliance requirements and schedules of Tri-Party Agreement milestones (e.g., M23, M41, M44, M45) that include actions on the retrieval of waste, development and implementation of RCRA corrective actions, closure plans, and post-closure monitoring. The single-shell tank monitoring would, therefore, include both vadose zone and groundwater characterization to detect contaminant sources in the vadose zone and groundwater and to delineate the nature of extent of contamination in both media so the necessary data needs are met to support waste retrieval, RCRA corrective actions, closure and post-closure monitoring. These activities will be carried out though various Tri-Party Agreement milestones as discussed in the preceding paragraphs. Wherever feasible, the characterization, monitoring, and corrective actions will be integrated on a sitewide basis to benefit other programs (e.g., CERCLA) and to provide cost efficiencies.

C.3 References

40 CFR 264, Subpart F. U.S. Environmental Protection Agency. "Releases from Solid Waste Management Units." *U.S. Code of Federal Regulations.*

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act. 1980. Public law 96-150, as amended, 94 Stat. 2767, 42 USC 9601 et seq.

Ecology - Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy. 1998. *Hanford Federal Facility Agreement and Consent Order*. Document No. 89-10, Rev. 5 (The Tri-Party Agreement), Olympia, Washington.

Hazardous and Solid Waste Amendments of 1984. 42 USC. § 6924 et seq.; 40 CFR. § 260.1 et seq. and 40 CFR. § 280.10 et seq.

RCRA – Resource Conservation and Recovery Act. 1976. Public Law 94-580, as amended, 90 Stat. 2795, 42 USC 6901 et seq.

WAC 173-303-040. *Definitions.* Washington Administrative Code, Olympia, Washington.

WAC 173-303-645. *Releases from Regulated Units.* Washington Administrative Code, Olympia, Washington.

WAC 173-303-646. *Corrective Action***.** Washington Administrative Code, Olympia, Washington.

WAC 173-303-800. *Permit Requirements for Dangerous Waste Management Facilities.* Washington Administrative Code, Olympia, Washington.

Groundwater Strategy
Appendix D

Supplemental Information Developed in Support of the Groundwater Strategy

Appendix D

Supplemental Information Developed in Support of the Groundwater Strategy

Basis of Agreement

The U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) (i.e., the Tri-Parties) have noted a number of areas of agreement that provide a basis to develop a groundwater strategy:

1. The Tri-Parties desire to achieve a durable, agreement with common values that will allow for further planning.
2. The Tri-Parties recognize that monitoring for the *Resource Conservation and Recovery Act* (RCRA) and *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) are different (management of active waste facilities and cleanup of waste facilities). The shared goal is to develop plans and schedules to install the optimal number of new wells for groundwater monitoring. This recognizes that a variety of wells (shallow and deep) will be needed.
3. Problems need to be approached in a fresh way.
4. Establishing a sufficient monitoring network or networks will be a multi- year effort. The Tri-Parties need to agree on appropriate criteria for prioritization.
5. Prioritization must be implemented across the three statutes (RCRA, CERCLA, and the *Atomic Energy Act of 1954*).
6. The extensive groundwater contaminant plumes of tritium, nitrate and iodine-129 have resulted from past-practice discharges to the soil at cribs, ponds and ditches. These discharges were generally high-volume and of relatively low concentration. However, there is relatively little inventory that remains in the vadose zone that is long-lived and mobile and could contribute to additional groundwater contamination in the future. It is assumed that most of the liquids discharged to the soil have drained, and the soil at these sites may be approaching field capacity. Characterization will be needed prior to site closure to confirm this.
7. Further investigations and additional monitoring are required to deal with the carbon tetrachloride plume.
8. Current remedial actions need to focus on carbon tetrachloride, chromium, strontium-90 (100 N Area), technetium-99, and uranium. As other contaminant plumes are discovered they will be prioritized.
9. Carbon tetrachloride characterization is less mature than the other contaminants listed in item 8.

10. There is likely a large inventory of long-lived and mobile contaminants in the vadose zone from past leaks at single-shell tanks, overflow from tanks to cribs, and in specific retention trenches where tank waste was disposed to the soil. It is assumed that long-lived and mobile contaminants in the vadose zone have or will impact groundwater in the future. Characterization data and detection monitoring are both important for the single-shell tank sites.
11. The design for new groundwater monitoring wells needs to anticipate the dynamics of the aquifer. In some areas, existing monitoring wells are going dry and the direction of groundwater is changing. The significant inventory of mobile and long-lived contaminants, dropping water level, and dynamics in flow directions and rates justify upgrades to the monitoring system.
12. There are opportunities for cost efficiencies in the areas of investigation-derived waste management, purge water management, sampling schedules, number of contaminants, and statistical approaches.
13. The impact of discharges from septic systems on contaminant movement in the vadose zone and on groundwater flow needs to be better understood.

D.1 References

Atomic Energy Act of 1954. 1954. Public Law 83-703, as amended, 68 Stat. 919, 42 USC 2011 et seq.

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act. 1980. Public law 96-150, as amended, 94 Stat. 2767, 42 USC 9601 et seq.

RCRA – Resource Conservation and Recovery Act. 1976. Public Law 94-580, as amended, 90 Stat. 2795, 42 USC 6901 et seq.

Groundwater Strategy
Appendix E

Letter to the Hanford Advisory Board on Exposure Scenarios For The 200 Area

Tri-Party Agreement

02-HAB-0006 JUL 1 1 2002

Mr. Todd Martin, Chair
Hanford Advisory Board
1933 Jadwin Avenue, Suite 135
Richland, Washington 99352

Dear Mr. Martin:

CONSENSUS ADVICE #132: EXPOSURE ENARIOS A ORCE ON THE 200 AREA

This is in response to your advice #132 dated June 02, regarding th Plateau risk framework and exposure scenario develop t.

The three agencies appreciate the effort the Board has unde to provide us with advice as we enter this critical phase of on and closu Hanford's Central Plateau. Your advice, combined with e inpu eceived from ibal Nations and interested citizens, provided us wit e guidan eeded to develop a credible exposure scenario for the Central Plateau.

We believe that the risk fram work delinea in the a chment to this letter adheres closely t our advice. e cases of mino , the agencies considered your advic an de the deci to deviate based chnical and logistical factors. The inclusion of nds and B- in the core zone was based on the following: the need to expand the c ne to inclu e footprint of the Waste Treatment Plant (Vitrification an d the need id splitting waste sites of anticipated similar closure str egies. No standing su a deviation, the agencies fully support the notion of evalua g the possibi f shrink g the core zone. We support your advice to maximiz e potential for Tribal uses in the core zone. The potential for extended human ac es in the core z would provide an added advantage of maintaining the knowledge waste left the core zone after the remedial actions are completed.

We intend to fully i ate the decisions for the remediation of the source units with those for the remediation of groundwater using the appropriate regulatory process. Establishing points of compliance and remedial objectives will be done in adherence regulations. Also, we have started an effort to evaluate groundwater technologies necessary to deploy to remediate groundwater in the core zone. This effort will be advanced through the regulatory documents and reviews of the corresponding groundwater operable units.

Washington State Department of Ecology ▲ U.S. Environmental Protection Agency ▲ U.S. Department of Energy

E.1

Mr. Todd Martin -2- JUL 1 1 2002
02-HAB-0006

One of the major missions the three agencies have embarked on is the coordination of the risk assessment efforts on the Central Plateau to maintain consistency in the standards used across the site, including data collection, accurate inventory, and land use assumptions.

The U.S. Department of Energy is developing a Long-Term Stewardship (LTS) Plan for the Hanford Site. The recommendation for the creation of a "coalition of groups, to include the Tribes, local government, and other affected entities" to administer the LTS responsibilities of the site should be discussed and evaluated within the context of developing the site LTS Plan. We welcome any proposals from the Board to start such a discussion and evaluation.

We reiterate our appreciation for the work you have done to support the risk framework. If you need further information or assistance, please contact the U.S. Department of Energy, Richland Operations Office, Public Involvement Manager, [illegible] Sherman on (509) 376-6216.

Keith A. Klein, Manager
U.S. Department of Energy
Richland Operations Office

David R. [illegible]
Acting [illegible] Project Manager
U.S. Environmental Protection Agency

Michael A. Wilson, Project Manager
State of Washington Department of Ecology

IPI:YS

Attachment

02-HAB-0006

cc:
P. Mabie, EnviroIssues
M. Crosland, EM-11

U.S. Senators (OR)
Gordon H. Smith
Ron Wyden

U.S. Representative (OR)
Earl Blumenauer
Peter DeFazio
Darlene Hooley
Greg Walden

State Senators (WA)
Pat Hale
Mike Hewitt

U.S. Senator (WA)
Maria Cantwell
Patty Murray

U.S. Representative (WA)
Norm Dicks
Jennifer Dunn
Richard Hastings
George Nethercutt

E.3

Attachment

Decision Strategy (Risk & Regulatory Framework)

Risk Framework Description (Tri-Party Agreement):

1. The Core Zone (200 Areas including B Pond (main pond), and S Ponds) will have an Industrial Scenario for the foreseeable future.
2. The Core Zone will be remediated and closed allowing for "other uses" consistent with an industrial scenario (environmental industries) that will maintain active human presence in this area, which in turn will enhance the ability to maintain the institutional knowledge of the wastes left in place for the future generations. Exposure scenarios used for this zone should include a reasonable maximum exposure to a worker/day user, to possible Native American users, and to intruders.
3. DOE will follow the required regulatory processes for groundwater remediation (including public participation to establish the points of compliance and remedial action objectives). It is anticipated that groundwater contamination under the Core Zone will preclude beneficial use for the foreseeable future, which is at least the period of waste management and institutional controls (150 years). It is assumed that the tritium and iodine-129 plumes beyond the Core Zone boundary will exceed the drinking water standards for the period of the next 150 to 300 years (as for the tritium plume). It is expected that other groundwater contamination will remain below, or be restored to drinking water levels outside the Core Zone.
4. No drilling for water use or other use will be allowed in the Core Zone. An intruder scenario will be calculated for in assessing the risk to human health and environment.
5. Waste Sites outside the Core Zone but within the Central Plateau (200 N, Gable Mountain Pond, B/C Crib Control Area) will be remediated and closed based on an evaluation of multiple land use scenarios to optimize land use, institutional control costs and long term stewardship.
6. An Industrial scenario will set cleanup levels on the Central Plateau. Other scenarios (e.g., residential, recreational) may be used for comparison purposes to support decision making especially for:
   - The post-institutional controls period (>150 years).
   - Sites near the Core Zone perimeter to analyze opportunities to "shrink the site".
   - Early (pre-existing) closure/remediation decisions.
7. This framework does not deal with the tank retrieval decision.

Appendix E – Central Plateau Vision and Strategy

Central Plateau Vision and Strategy Team — Status Report 8/14/2002

Overview

The Central Plateau Vision and Strategy Team is one of seven C3T Target-of-Opportunity sub-teams. The team initially addressed five specific targets of opportunity that were aligned with two DOE Top-to-Bottom Review Issues - Accelerating Site Closure and Improving Agreements. The team continues as integrator for ongoing actions and outcomes from the other C3T action teams.

This interim status report provides interested parties with a summary of this team's activities through July 2002. In addition to this brief summary, we have attached an updated version of the Team's status report provided at the June 27-28th, 2002 C3T workshop along with several attachments that contain working products and other relevant materials.

Charter

Articulate the long-term vision for the Central Plateau (CP) and develop an overall strategy for making CP decisions that would ensure consistency, protection of human health and the environment, and efficiency.

Status/Progress to Date

This Team has focused its efforts in three primary areas.

- **Central Plateau Vision**. This work builds upon the work by the three agencies to develop a risk assessment framework for application to CP decisions. A series of workshops were held with the Hanford Advisory Board's (HAB) Exposure Scenarios Task Force and resulted in HAB Advice #132 (see Attachment #1) and the Tri-Parties response (Attachment #7). This set of actions sets a vision for the Central Plateau to transition to an Industrial Land Use Scenario and generally reaffirms previous values and guidance from the Future Site Uses Working Group (1992) and the Tank Waste Task Force (1993). This vision is also consistent with the Record of Decision for the Hanford Comprehensive Land Use Plan Environmental Impact Statement (November 1999).

- **Remediation and Closure Strategy**. This activity has supported the negotiation of the coordinated RI/FS sequence for the 200 Area Waste Sites and resulted in changes to TPA milestone series M-13, M-15, M-16 and M-20 (Attachment #2). In addition, the August 2002 Hanford Performance Management Plan established Strategic Initiative #5 that establishes milestones for accelerated assessment, remediation and closure of waste sites on the Central Plateau (Attachment #5). These efforts are continuing to establish an optimize sequence for remediating Central Plateau waste sites and facilities. This work has also developed a set of decision roadmaps that show interconnections among related decisions in project operating on the Central Plateau (Attachment #5).

- **Decision Strategy (Including risk and regulatory framework)**. This activity has focused on developing a common risk framework and definition of exposure scenarios to support decision making on the Central Plateau. As noted earlier, this work builds upon interactions with the HAB Exposure Scenarios Task Force and Tri-Party interactions. The risk framework is documented in Attachment #4 and Attachment #7. In addition, this work has identified "risk insertion points" (Attachment #3) that define when and where risk-related decisions will be required.

Path Forward

- **Central Plateau Vision**.
  - Support HAB and public interactions regarding the Central Plateau vision (Fall 2002).

- **Remediation and Closure Strategy**.
  - Provide policy-level support to development of integrated Site schedule and WBS (January 2003).
  - Support development plan to optimize the timing and sequence for disposition of excess facilities and remediation of waste sites that pose the highest threat to groundwater (HPMP commitment, 5/30/03).

- **Decision Strategy (Including risk and regulatory framework)**.
  - Oversee refinement of risk framework to ensure its appropriate application in hanford risk assessments.
  - Provide integration and coordination of remaining policy issues that emerge from other C3T Teams.

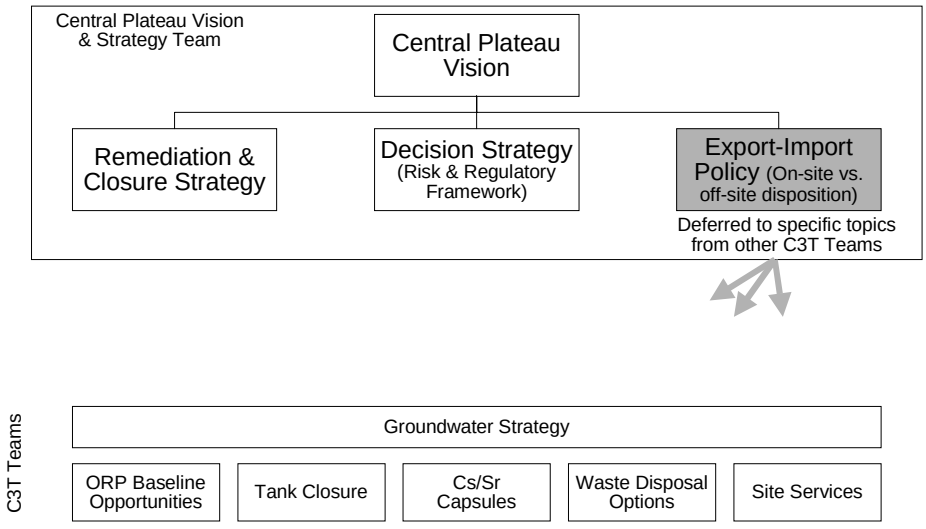
Central Plateau Vision and Strategy Team
Status Report: Updated July 31, 2002

Charter: Articulate the long-term vision for the Central Plateau (CP) and develop an overall strategy for making CP decisions that would ensure consistency, protection of human health and the environment, and efficiency.

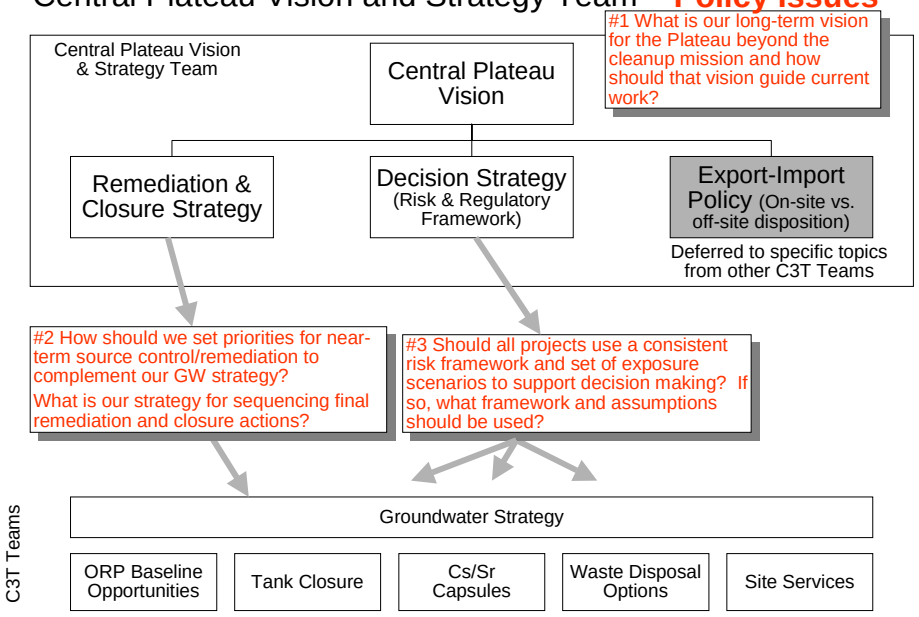
Team Members:

- DOE-RL: Wade Ballard (Team Lead), John Morse, Pete Knollmeyer, George Sanders, Mike Thompson,
- DOE-ORP: Steve Wiegman, Bob Lober, Joe Cruz
- Ecology: Laura Cusack, Suzanne Dahl, John Price
- EPA: Dennis Faulk
- Contractors: Jim Honeyman, Moses Jarayssi, Wayne Johnson, Tony Knepp, Bill Ritter, Terry Sams, Mark Triplett, Tony Umek

Central Plateau Vision and Strategy Team
Areas of Emphasis and Linkage to other C3T Teams

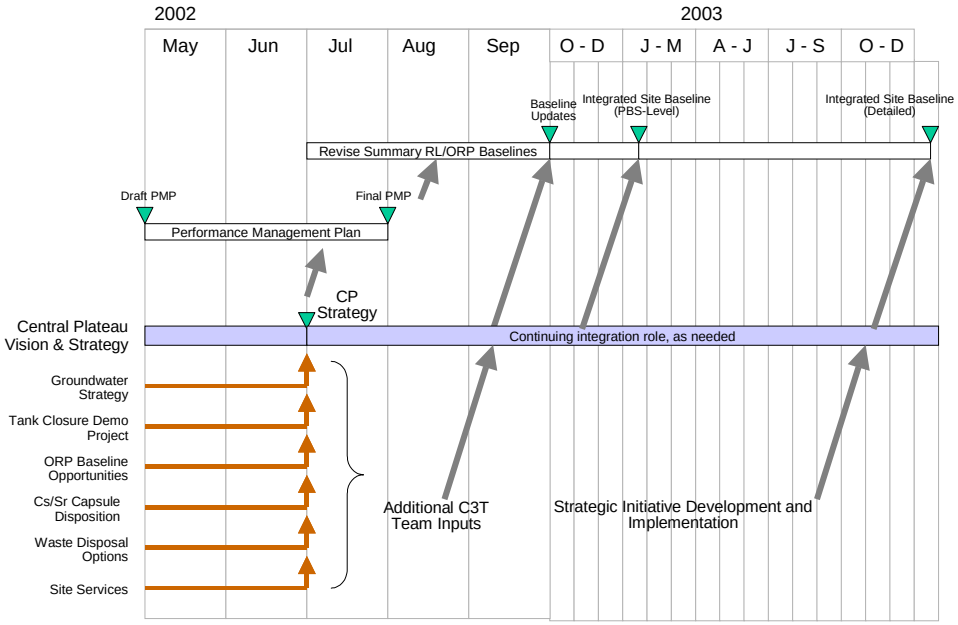


Central Plateau Vision and Strategy Team – **Policy Issues**



July 31, 2002 Central Plateau Vision & Strategy Team 3

Path Forward – CP Team will integrate C3T Team and project inputs into the August 1st Revision of the PMP and subsequent Baseline Revisions



July 31, 2002 Central Plateau Vision & Strategy Team 4

Central Plateau Vision and Strategy Team – Summary of Status

- Vision for the Central Plateau.
  - Done — ✓ Advice from HAB Ad Hoc Task Force
  - Ongoing < ❑ Developing a common Risk Framework (includes vision for future use of the Central Plateau)
  - Ongoing < ❑ Agency response to HAB advice
- Remediation & Closure Strategy
  - ✓ Completed negotiation of coordinated RI/FS sequence for 200 Area Waste Sites (changes to M-13, M-15, M-16, and M-20)
  - ✓ PMP commitment to establish optimized timing and sequence to address Central Plateau waste sites that pose the highest threat to groundwater by June 30, 2003.
  - ❑ DOE/Contractor task force addressing potential "optimized" strategy/sequence to efficiently link remediation/closure of waste sites, canyons, and tank farms (input to August 1 PMP and Integrated Site Baseline.)
  - ❑ Central Plateau mapping activities to show potential linkages among waste sites, tanks, canyons
- Decision Strategy (Risk & Regulatory Framework)
  - ✓ Development of a Risk Framework (exposure scenarios for all CP risk assessments)
  - ✓ Advice from HAB Ad Hoc Task Force
  - ✓ Developed schedule for application of the risk framework to Central Plateau decisions ("Risk Insertion Points")
  - ❑ Agency response to HAB advice
- Decision Roadmap (Pending Decisions)
  - ✓ Developed decision roadmaps for PMP Initiatives
  - ❑ Developing Decision Baselines for all acceleration plans to support development of the August 1 PMP and the Integrated Site Baseline
  - ❑ Identifying remaining decision points for addressing Key Policy Issues

- Vision for the Central Plateau.
  - ✓ Advice from HAB Ad Hoc Task Force
  - ❑ Developing a common Risk Framework (includes vision for future use of the Central Plateau)
  - ❑ Agency response to HAB advice

Central Plateau Vision – Prior Advice and Decisions

Hanford Future Site Uses Working Group (December 1992)

"***Use the Central Plateau Wisely for Waste Management***…Considering the amount of waste that must be dealt with, its long life span, and the anticipated length of time that the cleanup will take, the Working Group assumed that some type of government presence or oversight will be necessary for the foreseeable future due to the anticipated level of residual contamination in the Central Plateau. The Central Plateau would be an "exclusive" area, surrounded by a "buffer" zone of sufficient size to reduce exposure to risks emanating from the waste management activities occurring there…"

Hanford Advisory Board Advice (June 7, 2002)

Exposure Scenarios Task Force on the 200 Area

The Board acknowledges that some waste will remain in the core zone when this cleanup effort is complete. However, the core zone should be as small as possible and should not include contaminated areas outside the 200 Area fences. The waste within the core zone should be stored and managed to make it inaccessible to inadvertent intruding humans and animals.

A continued human presence in the core zone would provide an ongoing, active institutional interest vested in future management of the risks posed by Hanford waste. One way to ensure this continuous human presence is to maximize the potential for any beneficial use of the accessible areas of the core zone, rather than rely only on long-term government control of these areas.

See Attachment #1 for full text of HAB advice.

1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002

Hanford Comprehensive Land Use Plan Environmental Impact Statement

DOE's Preferred Alternative as designated in the ***Record of Decision*** (Nov. 2, 1999)

"The Central Plateau (200 Areas) geographic area will be designated Industrial-Exclusive. An Industrial-Exclusive land-use designation will allow for continued Waste Management operations within the Central Plateau geographic area consistent with past NEPA, CERCLA, and RCRA commitments that have established numerous waste management treatment, storage and disposal facilities such as, low-level waste burial grounds, hazardous wastes burial grounds, transuranic treatment and storage facilities, liquid wastes treatment, storage and disposal facilities, transuranic separation facilities, isotopic separation facilities, vitrification facilities, etc. This designation will also allow expansion of existing facilities or development of new compatible facilities. Designating the Central Plateau as Industrial-Exclusive will be consistent with the Hanford Future Site Working Group's 1992 recommendations, current DOE management practice, other governments' recommendations, and many public stakeholder values throughout the region."

Vision for the Central Plateau

Policy Issue #1

What is our long-term vision for the Plateau beyond the cleanup mission and how should that vision guide current work?

Vision Statement (Draft)

The Central Plateau is currently functioning exclusively as a waste management area and will transition to an industrial land use scenario by 2035. Current and long term stewardship controls will address groundwater use and the integrity of waste disposal.

Transition the Central Plateau from active cleanup and waste management (over the next 35 – 50 years) to an to an area that has the potential to be used for other industrial purposes. Institutional controls and stewardship actions will manage the long-term risk issues for the Site associated with groundwater use and isolation of waste disposal units from inadvertent intruders.

HAB Advice (June 7, 2002)

The Board believes that sound management, stewardship, and cleanup decisions must begin now to build equity over generations. The Tri-Parties need to engage immediately in developing robust, flexible, and creative management systems to address long-term stewardship. The Board recommends that a coalition of groups, to include the Tribes, local government, and other affected entities as appropriate be created to administer the long-term stewardship responsibilities for this site. Stewardship should be an active process involving the entire spectrum of management, education, and protection activities.

July 31, 2002 Central Plateau Vision & Strategy Team 7

- Remediation & Closure Strategy
  - ✓ Completed negotiation of coordinated RI/FS sequence for 200 Area Waste Sites (changes to M-13, M-15, M-16, and M-20) [**See Attachment #2**]
  - ✓ PMP commitment to establish optimized timing and sequence to address Central Plateau waste sites that pose the highest threat to groundwater by June 30, 2003.
  - ❑ DOE/Contractor task force addressing potential "optimized" strategy/sequence to efficiently link remediation/closure of waste sites, canyons, and tank farms (input to August 1 PMP and Integrated Site Baseline.)
  - ❑ Central Plateau mapping activities to show potential linkages among waste sites, tanks, canyons

Policy Issue #2

How should we set priorities for near-term source control/remediation to complement our GW strategy?

What is our strategy for sequencing final remediation and closure actions?

- Do no further harm
  - Take early/interim actions on high risk source units (threat to GW) – U Plant, B/C Cribs, 618-10/11
  - Reduce water use on the Plateau
  - Eliminate pipeline leaks
  - No unlined disposal
  - Tank waste retrieval and treatment
  - Interim actions at tank farms to reduce impact to groundwater

- Do work "outside-in", i.e., remediate waste sites closest to the River first
  - Gable Mountain Pond
  - B Pond
  - 200 N Area
  - 618-10/11
- Explore an optimized strategy/sequence to link final cleanup and closure actions for Central Plateau waste sites, tanks, canyons, and other surplus facilities. [UNDER DEVELOPMENT]

July 31, 2002 Central Plateau Vision & Strategy Team 8

Optimized Remediation/Closure Strategy for the Central Plateau

Objective: Explore an optimize strategy/sequence for the final cleanup and closure of Central Plateau waste sites, tanks, canyons, and other surplus facilities.

Potential Benefits: An optimized closure approach has the following potential benefits:

- Efficiency in remediation/closure operations
- Efficiency and consistency in decision making
- Optimized timing to avoid rework
- Optimize supporting operations and infrastructure
- Optimizes resource utilization (both in terms of labor and raw materials)

Key Strategic Decisions: There are two fundamental decisions that need to be addressed in optimizing our remediation/closure strategy:

- What criteria should be used to decide upon logical groupings of waste sites?
- What criteria should be used to define the priority or sequence for cleanup actions?

Approach: Large-scale waste site maps (See Poster Displays) showing contaminant inventories are being used to identify candidate areas and waste site groupings. Actual selection of areas will depend upon tank retrieval/closure sequence, canyon disposition sequence, and findings from ongoing waste site investigations.

- Decision Strategy (Risk & Regulatory Framework)
  - ✓ Development of a Risk Framework (exposure scenarios for all CP risk assessments)
  - ✓ Advice from HAB Ad Hoc Task Force
  - ✓ Developed schedule for application of the risk framework to Central Plateau decisions ("Risk Insertion Points" **See Attachment #3**)
  - ❑ Agency response to HAB advice

Policy Issue #3

Should all projects use a consistent risk framework and set of exposure scenarios to support decision making? If so, what framework and assumptions should be used?

Hanford Advisory Board Advice (June 7, 2002)

Exposure Scenarios Task Force on the 200 Area

For the Central Plateau, the Board advises the agencies to analyze a range of potential human health and ecological risks, including the reasonable maximum risk expected over time. The stakeholder community will use this analysis to advise the agencies on appropriate cleanup decisions. The risk analysis should include: a reasonable maximum exposure to a resident and/or Native American, including groundwater use, in what is currently labeled the buffer zone and in areas freed up for use as the core zone shrinks. For the waste management areas within the core zone, exposure scenarios should include a reasonable maximum exposure to a worker/day user, to possible Native American users, and to intruders.

The Board also recommends that DOE continue to refine its ability to make accurate risk projections by continuing efforts to gather the data necessary to accurately characterize waste inventories and locations. The results of these analyses should be provided as soon as possible and in a publicly useful format that depicts geographic variations of risks over time.

Central Plateau Risk Framework

- Since January 2000, DOE, Ecology and EPA have conducted a jointly led effort to develop a common set of exposure scenarios to be used in Central Plateau risk assessments.
- The Hanford Advisory Board commissioned an Ad Hoc Task Force that reached beyond HAB membership. This Task Force concluded its efforts and the HAB issued advice (June 7, 2002, #132).
- The Tri-Parties now agree on most elements of the risk framework.

Decision Strategy (Risk & Regulatory Framework)

Risk Framework Description (Proposed Tri-Party Agreements):

1. The Core Zone (200 Areas including B Pond (main pond), and S Ponds) will have an Industrial Scenario for the foreseeable future.
2. The Core Zone will be remediated and closed allowing for "other uses" consistent with an industrial scenario (environmental industries) that will maintain active human presence in this area, which in turn will enhance the ability to maintain the institutional knowledge of the wastes left in place for the future generations. Exposure scenarios used for this zone should include a reasonable maximum exposure to a worker/day user, to possible Native American users, and to intruders. An assumption of Industrial land use will be used to set cleanup levels.
3. DOE will follow the required regulatory processes for groundwater remediation (including public participation) to establish the points of compliance and remedial action objectives. It is anticipated that groundwater contamination under the Core Zone will preclude beneficial use for the foreseeable future, which is at least the period of waste management and institutional controls (150 years). It is assumed that the tritium and iodine-129 plumes beyond the Core Zone boundary will exceed the drinking water standards for the period of the next 150 to 300 years (less for the tritium plume). It is expected that other groundwater contaminants will remain below, or be restored to drinking water levels outside the Core Zone.
4. No drilling for water use or otherwise will be allowed in the Core Zone. An intruder scenario will be calculated for in assessing the risk to human health and environment.
5. Waste Sites outside the Core Zone but within the Central Plateau (200 N, Gable Mountain Pond, B/C Crib Controlled Area) will be remediated and closed based on an evaluation of multiple land use scenarios to optimize land use, institutional control cost, and long term stewardship.
6. Other land use scenarios (e.g., residential, recreational) may be used for comparison purposes to support decision making especially for:
   - The post-institutional controls period (> 150 years).
   - Sites near the Core Zone perimeter to analyze opportunities to "shrink the site".
   - Early (precedent-setting) closure/remediation decisions.
7. This framework does not deal with the tank retrieval decision.

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- Decision Roadmap (Pending Decisions)
  - ✓ Developed decision roadmaps for PMP Initiatives
  - ❑ Developing Decision Baselines for all acceleration plans to support development of the August 1 PMP and the Integrated Site Baseline
  - ❑ Identifying remaining decision points for addressing Key Policy Issues

- Decision roadmap (Decision Baseline) is under development to support the update of the PMP and development of an Integrated Site Baseline.
- Decision points show interactions among key decisions and highlight opportunities to coordinate related decisions. See Attachment #5 for detailed display of linked decisions:
  - Interim actions to protect groundwater
  - Optimized remediation and closure strategy/sequence
  - Waste Disposal System configuration decisions
  - WTP Treatment Scope (e.g., Cs/Sr capsules)

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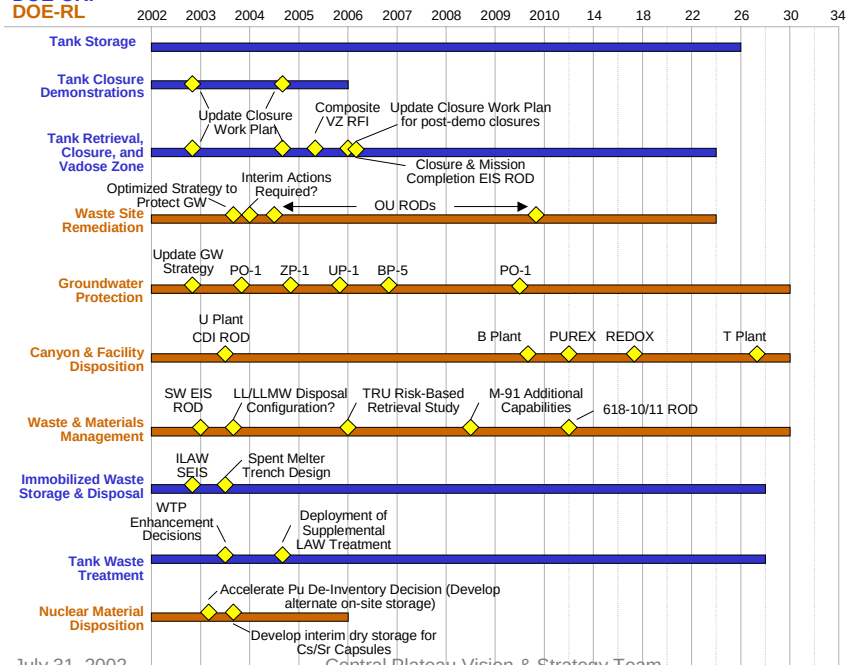
Key Enabling Decisions for Hanford's Accelerated Site Closure Strategy

(Approximate dates based on Baselines as modified by May 1 PMP and C3T team inputs)



Key Policy Issue Requiring "Gang of Four" Discussion and Resolution

Policy Issue #3

Should all projects use a consistent risk framework and set of exposure scenarios to support decision making? If so, what framework and assumptions should be used?

Backup Materials

- Attachment #1: HAB Advice (#132) on the Ad Hoc Exposure Scenarios Task Force, June 7, 2002.
- Attachment #2: 200 Area Waste Sites Agreement including RI/FS schedules and consolidation of Operable Units.
- Attachment #3: "Risk Insertion Points" Schedule showing timing for conducting risk assessments.
- Attachment #4: Risk Framework Overview. Shows detailed assumptions and boundaries for the Core Zone and Buffer Zone.
- Attachment #5: Decision Roadmaps (Under Development). Shows the timing and interconnections among key decisions that will implement the PMP acceleration plan for Central Plateau actions.
- Attachment #6: Strategic Initiative 5 – Accelerate Central Plateau Cleanup (from July 17, 2002, Hanford Performance Management Plan, including Appendix A).
- Attachment #7: Agency response to HAB Advice #132: Exposure Scenarios Task Force on the 200 Area (July 11, 2002).

Attachment #1
HAB Advice – Exposure Scenarios Task Force on the 200 Area

Hanford Advisory Board Advice (June 7, 2002)

Subject: **Exposure Scenarios Task Force on the 200 Area**

Dear Mssrs. Klein, Boston, Iani, and Fitzsimmons,

The Exposure Scenarios Task Force was formed by the Tri-Party Agreement (TPA) agencies to provide them with a broad range of stakeholder values specific to the development of exposure scenarios and risk analyses to support future cleanup decisions. As a secondary product, the Hanford Advisory Board (Board) members on this Task Force were asked to develop advice for the TPA agencies covering the risk framework for the 200 Area.

The Board acknowledges that some waste will remain in the core zone when this cleanup effort is complete. However, the core zone should be as small as possible and should not include contaminated areas outside the 200 Area fences. The waste within the core zone should be stored and managed to make it inaccessible to inadvertent intruding humans and animals.

A continued human presence in the core zone would provide an ongoing, active institutional interest vested in future management of the risks posed by Hanford waste. One way to ensure this continuous human presence is to maximize the potential for any beneficial use of the accessible areas of the core zone, rather than rely only on long-term government control of these areas.

Groundwater remediation must be an integral part of source term remediation. This effort should include aggressive technology development and implementation. Risk assessments must include all aspects of groundwater and vadose zone. Groundwater is a valuable resource with beneficial future uses that must not be restricted outside of the individual waste management unit points of compliance within the core zone.

The Board believes that sound management, stewardship, and cleanup decisions must begin now to build equity over generations. The Tri-Parties need to engage immediately in developing robust, flexible, and creative management systems to address long-term stewardship. The Board recommends that a coalition of groups, to include the Tribes, local government, and other affected entities as appropriate be created to administer the long-term stewardship responsibilities for this site. Stewardship should be an active process involving the entire spectrum of management, education, and protection activities.

For the Central Plateau, the Board advises the agencies to analyze a range of potential human health and ecological risks, including the reasonable maximum risk expected over time. The stakeholder community will use this analysis to advise the agencies on appropriate cleanup decisions. The risk analysis should include: a reasonable maximum exposure to a resident and/or Native American, including groundwater use, in what is currently labeled the buffer zone and in areas freed up for use as the core zone shrinks. For the waste management areas within the core zone, exposure scenarios should include a reasonable maximum exposure to a worker/day user, to possible Native American users, and to intruders.

The Board also recommends that DOE continue to refine its ability to make accurate risk projections by continuing efforts to gather the data necessary to accurately characterize waste inventories and locations. The results of these analyses should be provided as soon as possible and in a publicly useful format that depicts geographic variations of risks over time.

Finally, the Board believes the values expressed by the Future Site Uses Working Group are still applicable. These values should continue to be used as a guide for making cleanup decisions.

Sincerely,

Todd Martin, Chair
Hanford Advisory Board

Attachment #2

200 Area Waste Sites Agreement including RI/FS schedules and consolidation of Operable Units

Completed negotiation of coordinated RI/FS sequence for 200 Area Waste Sites

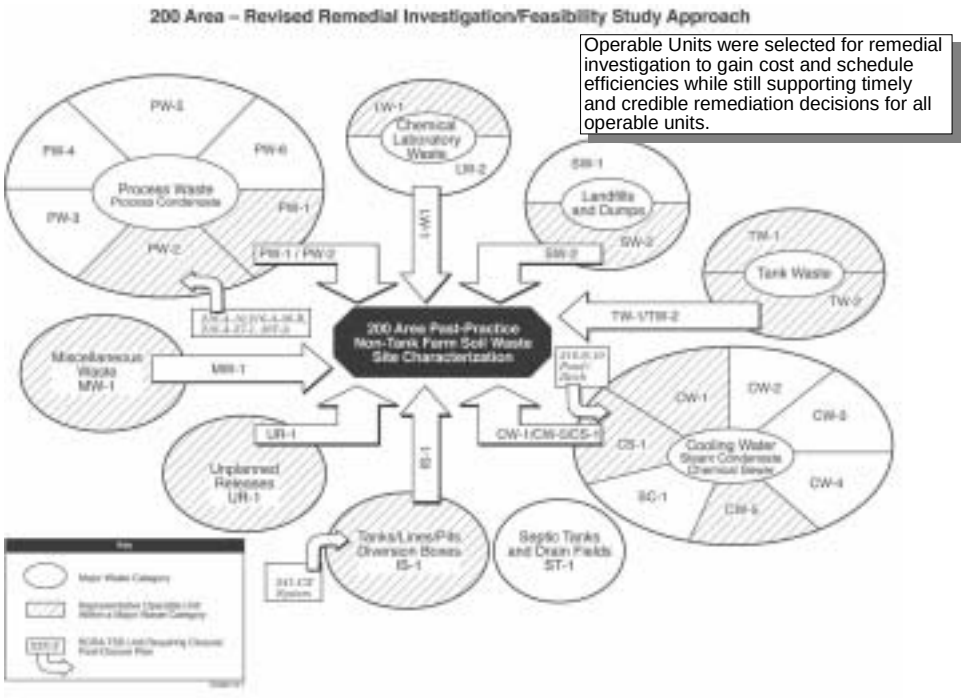
Operable units were combined into logical groups. The sequencing of subsequent RODs will facilitate coordination of remediation actions and schedules for adjacent tank farms and canyons.

	Rep. OU's	M-20 TSD C/PC	Lead Agency	OU's	Consolid'd OU's Work Plans	CALENDAR YEAR 01	02	03	04	05	06	07	08	# Waste Sites in OU	# Sites Impacted by TF[a]	# Sites Impacted by CDI[a]	Waste Category	FS/PP Strategy
1	●	●	Ecology	PW-2				●	▲	▽	·····			32	0	5	Process Condensate/ Process Waste	FS/CP/PP 5
2		○	Ecology	PW-4	1									16	0	0		
3	●		EPA	PW-1		✦			●	·····	◆			10	1	2		FS/PP 6
4			EPA	PW-3										11	0	0		
5			EPA	PW-6	2									8	0	0		
6			EPA	PW-5										9	0	0		
7	●		EPA	TW-1		●	▽	═══	◆					37	1	0	Tank/Scavenged Waste	FS/PP 2
8	●		Ecology	TW-2	3	●	▽	═══	◆					30	4	0		
9	●	●	Ecology	CW-1		═══	◆							26	1	1	Cooling Water/ Chemical Sewer/ Steam Condensate	FS/CP/PP 1
10			[c]Other 200 North Sites		4									14	0	0		
11	●	●	Ecology	CS-1	5			●	▲	▽	═══	◆		7	0	0		FS/CP/PP 4
12			EPA	CW-2										8	0	0		FS/PP 3
13			EPA	CW-4										8	1	2		
14	●		EPA	CW-5			●	▲	▽	═══	◆			12	0	1		
15			EPA	SC-1	6									16	1	3		
16	●		Ecology	LW-1		✦			●	▲	·····	◆		10	0	0	Chemical Waste	FS/PP 7
17			Ecology	LW-2	7									17	0	0		
18			Ecology	SW-1										53	1	0	Landfill & Dumps	FS/PP 11
19	●		Ecology	SW-2	8				✦		●	·····	◆	50	0	0		
20	●		EPA	MW-1	9	✦			●		◆	·····		43	2	24	Miscellaneous	FS/PP 8
21	●	●	Ecology	IS-1			✦		●		▲	·····	◆	90	9	28	Tanks/Lines/Pits	FS/CP/PP 9
22			Ecology	ST-1	10									54	0	6	Septic	
23	●		Ecology	UR-1	11			✦		●		▲	····· ◆	120	11	34	Unplan'd Releases	FS/PP 10
													Total #	681	32	106		

LEGEND:

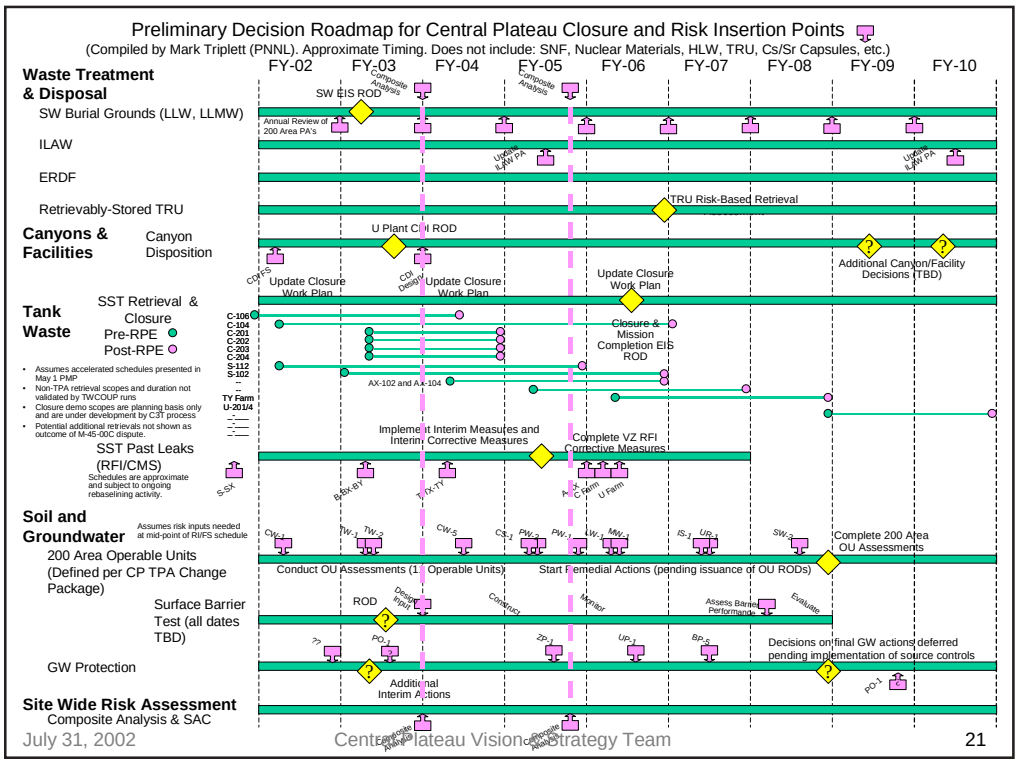
✦ RI/FS Workplan Draft A
● RI Fieldwork Complete
▲ RI Report Draft A
▽═══◆ FS/CP and Proposed Plan/Proposed Permit Mod to Draft A

[a] The number of OU waste sites that would like be impacted by a surface barrier placed over the tank farms (TF) or canyon buildings under the Canyon Disposition Initiative (CDI).
[b] Includes seven 200-CW-3 OU waste sites



Attachment #3

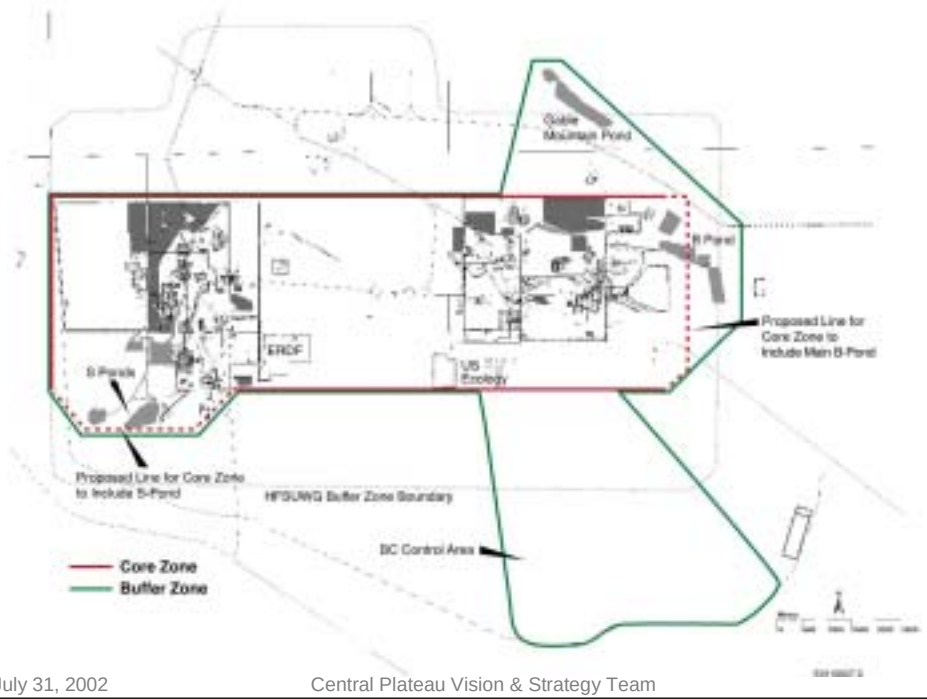
"Risk Insertion Points" Schedule showing timing for conducting risk assessments



Attachment #4

Risk Framework Overview. Shows detailed assumptions and boundaries for the Core Zone and Buffer Zone

Central Plateau Risk Framework Geographic Zones



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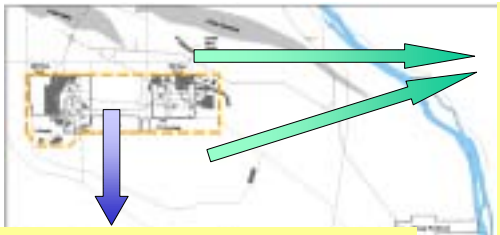

Buffer Zone:

Gable Mt. Pond, 200 N sites, BC Crib Controlled Area, Non-Radioactive DW Landfill)

Remediate based on evaluating multiple landuse scenarios to optimize: Land use, institutional controls, and long term stewardship

Core Zone:

Industrial Landuse for the foreseeable Future.

Remediate to allow for other “industrial” uses.

Maintain active human presence.

Use reasonable maximum exposure to a worker/day user, possible Native American users, and intruders.

No drilling allowed. Calculate risk for an intruder.

Zone Includes S-Ponds, B Pond.

Evaluate possibilities of shrinking the core zone.

Groundwater:

Follow regulatory process to establish GW remediation standards (points of compliance and remedial action objectives).

In the Core Zone, GW contamination anticipated to preclude beneficial use for the foreseeable future (at least 150 yrs).

Outside the Core Zone, it is assumed that the I-129 and Tritium plumes will exceed drinking water standards for the next 150 to 300 years (about 75 yrs for Tritium).

Other contaminants are expected to be below or restored to DWS.

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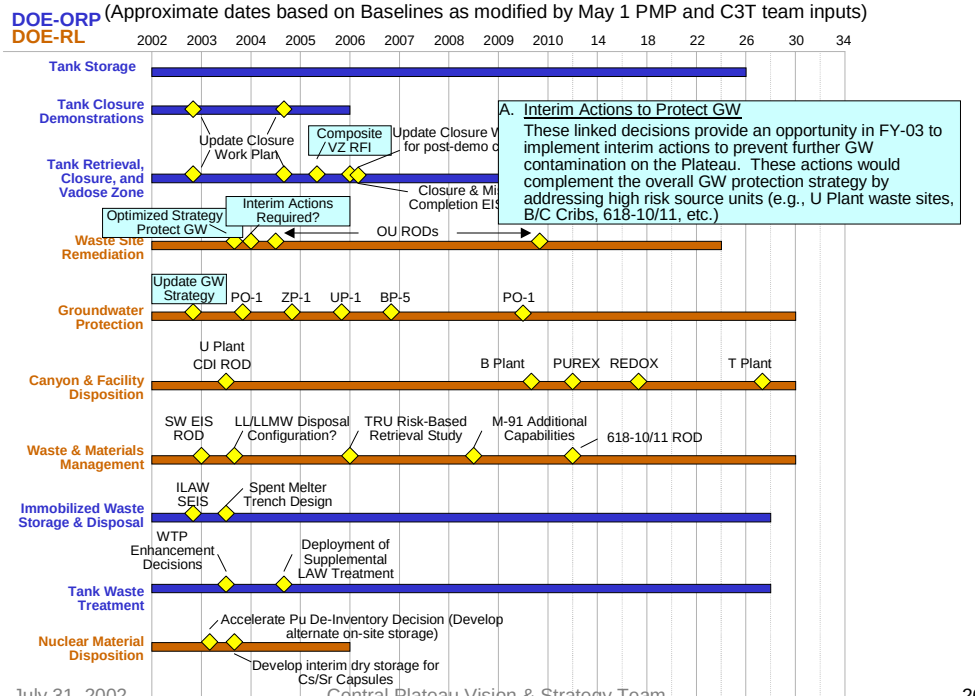
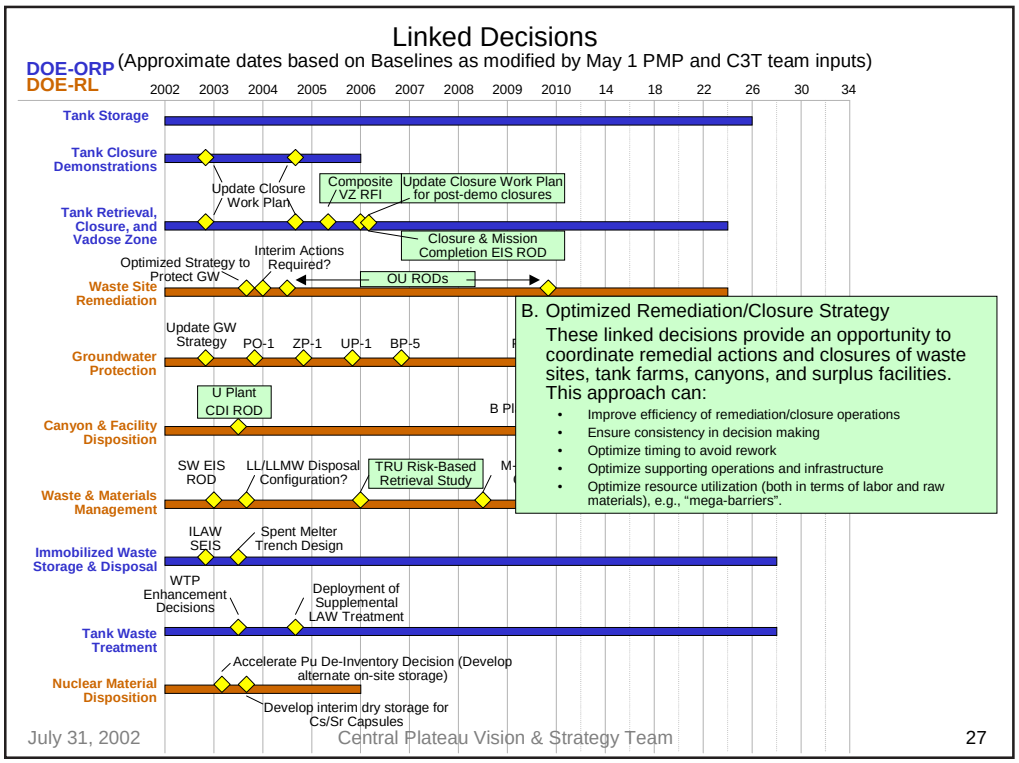
Attachment #5

Decision Roadmaps (Under Development). Shows the timing and interconnections among key decisions that will implement the PMP acceleration plan for Central Plateau actions.

Linked Decisions

(Approximate dates based on Baselines as modified by May 1 PMP and C3T team inputs)




Linked Decisions
DOE-ORP
DOE-RL
(Approximate dates based on Baselines as modified by May 1 PMP and C3T team inputs)
2002 2003 2004 2005 2006 2007 2008 2009 2010 14 18 22 26 30 34
Tank Storage
Tank Closure Demonstrations
Update Closure Work Plan
Composite VZ RFI
Update Closure Work Plan for post-demo closures
Tank Retrieval, Closure, and Vadose Zone
Closure & Mission Completion EIS ROD
Optimized Strategy to Protect GW
Interim Actions Required?
OU RODs
Waste Site Remediation
Update GW Strategy
PO-1
ZP-1
UP-1
BP-5
Groundwater Protection
U Plant CDI ROD
Canyon & Facility Disposition
SW EIS ROD
LL/LLMW Disposal Configuration?
TRU Risk-Based Retrieval Study
Waste & Materials Management
ILAW SEIS
Spent Melter Trench Design
Immobilized Waste Storage & Disposal
WTP Enhancement Decisions
Deployment of Supplemental LAW Treatment
Tank Waste Treatment
Accelerate Pu De-Inventory Decision (Develop alternate on-site storage)
Develop interim dry storage for Cs/Sr Capsules
Nuclear Material Disposition
B. Optimized Remediation/Closure Strategy
These linked decisions provide an opportunity to coordinate remedial actions and closures of waste sites, tank farms, canyons, and surplus facilities. This approach can:
• Improve efficiency of remediation/closure operations
• Ensure consistency in decision making
• Optimize timing to avoid rework
• Optimize supporting operations and infrastructure
• Optimize resource utilization (both in terms of labor and raw materials), e.g., "mega-barriers".
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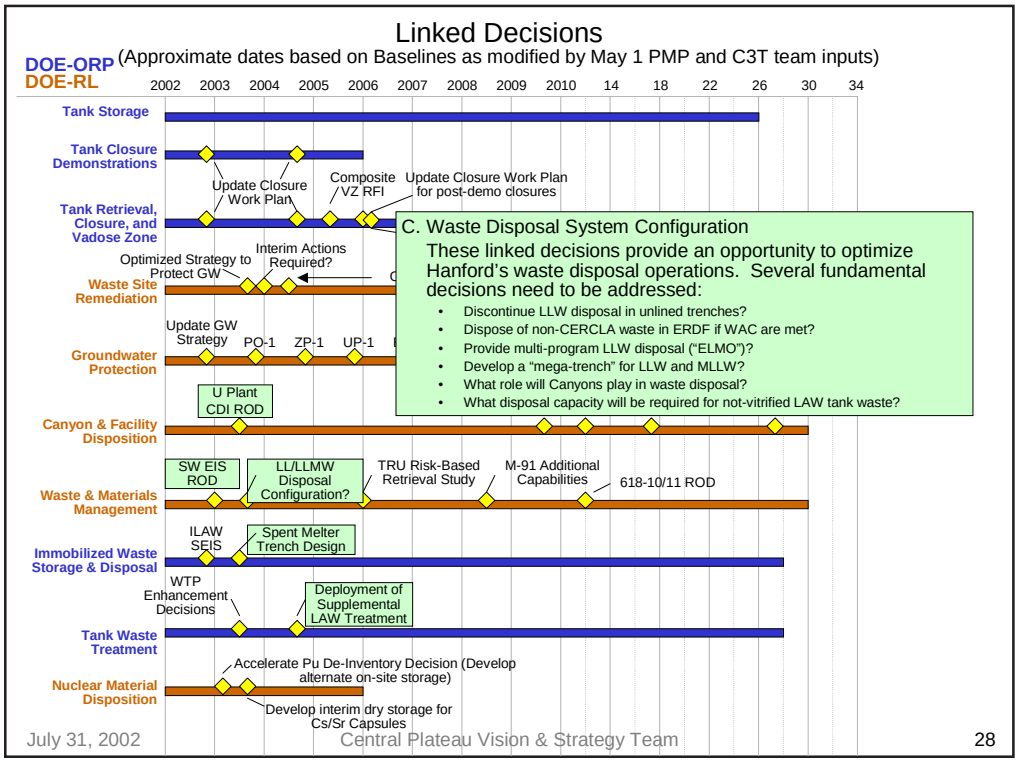
Linked Decisions
DOE-ORP
DOE-RL
(Approximate dates based on Baselines as modified by May 1 PMP and C3T team inputs)
2002 2003 2004 2005 2006 2007 2008 2009 2010 14 18 22 26 30 34
Tank Storage
Tank Closure Demonstrations
Update Closure Work Plan
Composite VZ RFI
Update Closure Work Plan for post-demo closures
Tank Retrieval, Closure, and Vadose Zone
Optimized Strategy to Protect GW
Interim Actions Required?
Waste Site Remediation
Update GW Strategy
PO-1
ZP-1
UP-1
Groundwater Protection
U Plant CDI ROD
Canyon & Facility Disposition
SW EIS ROD
LL/LLMW Disposal Configuration?
TRU Risk-Based Retrieval Study
M-91 Additional Capabilities
618-10/11 ROD
Waste & Materials Management
ILAW SEIS
Spent Melter Trench Design
Immobilized Waste Storage & Disposal
WTP Enhancement Decisions
Deployment of Supplemental LAW Treatment
Tank Waste Treatment
Accelerate Pu De-Inventory Decision (Develop alternate on-site storage)
Develop interim dry storage for Cs/Sr Capsules
Nuclear Material Disposition
C. Waste Disposal System Configuration
These linked decisions provide an opportunity to optimize Hanford's waste disposal operations. Several fundamental decisions need to be addressed:
• Discontinue LLW disposal in unlined trenches?
• Dispose of non-CERCLA waste in ERDF if WAC are met?
• Provide multi-program LLW disposal ("ELMO")?
• Develop a "mega-trench" for LLW and MLLW?
• What role will Canyons play in waste disposal?
• What disposal capacity will be required for not-vitrified LAW tank waste?
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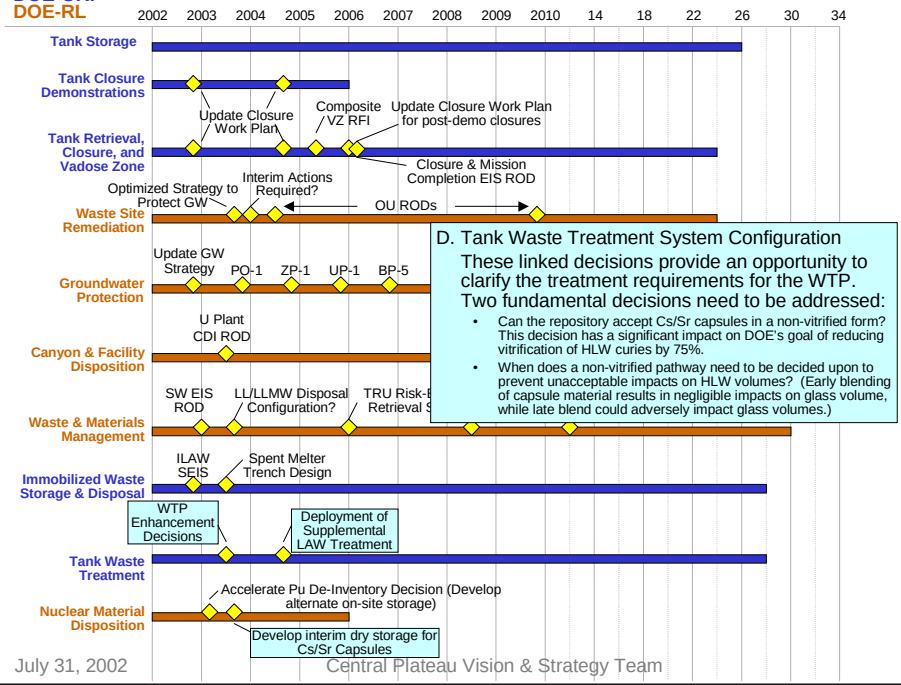
Linked Decisions

DOE-ORP
DOE-RL

(Approximate dates based on Baselines as modified by May 1 PMP and C3T team inputs)



D. Tank Waste Treatment System Configuration

These linked decisions provide an opportunity to clarify the treatment requirements for the WTP. Two fundamental decisions need to be addressed:

- Can the repository accept Cs/Sr capsules in a non-vitrified form? This decision has a significant impact on DOE's goal of reducing vitrification of HLW curies by 75%.
- When does a non-vitrified pathway need to be decided upon to prevent unacceptable impacts on HLW volumes? (Early blending of capsule material results in negligible impacts on glass volume, while late blend could adversely impact glass volumes.)

Attachment #6

Strategic Initiative 5 – Accelerate Central Plateau Cleanup (from July 17, 2002, Hanford Performance Management Plan, including Appendix A).

URL: http://www.hanford.gov/orp/uploadfiles/doe-orp.pdf

Attachment #7

Agency response to HAB Advice #132: Exposure Scenarios Task Force on the 200 Area (July 11, 2002).

URL: http://www.hanford.gov/boards/hab/advice/adviceindex.htm

Appendix F – Waste Disposal Project

C3T WASTE DISPOSAL OPTIONS TEAM

Summary of Subteam Reports:
Integrated MLLW/LLW Disposal
Accelerated Canyon Disposition
TRU Waste

June 27, 2002

Integrated MLLW/LLW Disposal

- Recommendation – Let's do it – next step - trade study of options (5 separate facilities or ?)
- ***Policy issue*** – Can we expand use of ERDF to include other appropriate Hanford waste?
- ***Policy issue*** – What is Tri-Parties' policy on offsite MLLW/ LLW disposal at Hanford?

Canyon Disposition Acceleration

- Recommendation – Let's do it!
- Implement accelerated U Plant disposition by 2010 (including integrated cleanup of adjacent soil sites)
- Assign team to prepare scope, schedule, budget for remaining 4 canyons (including recommendations on potential waste disposition opportunities)
- No major policy issues

TRU Disposal

- Recommendation – Manage Pre-1970 and Post-1970 TRU at Hanford the same way
- Carry out study to improve definition of scope of TRU at Hanford (where, how much, how retrievable?)
- Develop decision path for Hanford TRU disposition (NEPA/CERCLA/) - EIS?
- ***Policy issue*** – WIPP acceptability/disposal schedule alignment
- ***Policy issue*** – Treat offsite TRU at Hanford in order to fund accelerated Hanford TRU treatment and disposal?

F1 - Mixed/Low Level Waste Disposal Options Sub-Group

C3T MLLW Disposal Options Sub-Team Final Report

1. The issues we were assigned to evaluate

The "Waste Disposal Options Project Team" had responsibility for a total of five Targets of Opportunity. The Project Team Lead, Mr. Ron Skinnarland, WDOE, established three sub-teams to evaluate these Targets. One of the sub-teams was defined as the "MLLW Disposal Options Sub-Team."

The Target Of Opportunity, #25, "MLLW Disposal Cells" identified a "Mega-Trench" as having potential for significant cost savings over current and planned MLLW disposition.

2. List of sub-team members

Julie Atwood	BHI
Jim Baker	CHG
Dave Bartus	EPA
Dale Black	FH/WMP
Dewey Burbank	CHG
Ron Calmus	CHG
Craig Cameron	EPA
Ellen Dagan	RL/RCA
Vern Dronen	BHI
Dirk Dunning	OR DOE
Dave Einan	EPA
Linda Fassbender	PNNL
Ken Hladek	FH/WMP
Jeff James	BHI
Fred Jamison	Ecology
Phil LaMont	ORP/RD
Kent McDonald	FH/WMP
Dean Nester	FH/WMD
Owen Robertson	RL/ERD
Steve Schaus	CHG
Greg Sinton	RL/WMD
Ron Skinnarland	Ecology
Mike White	PNNL

3. The issues we focused on (what issues we decided to evaluate)

Currently there are three permitted MLLW disposal units with two more planned. There are three contractors and two DOE offices. There are four regulatory bases

(RCRA, CERCLA, DOE, and NRC) that govern the disposal activities. We decided to evaluate streamlining of these disposal facilities to create efficiencies in design, construction and operation.

The team had subject matter experts present construction, operation, and cost details of each of the existing and planned MLLW disposal facilities. Based upon these presentations, the team agreed that the focus of the effort should not be just on facility design and location. Significant improvements appear to be obtainable from the techniques employed in the operation and function of disposal facilities.

How can we build upon the engineering and business models developed for the ERDF project and apply them to future disposal capability for LLW and MLLW at Hanford? Issues include integrating trench operations for disposal of all MLLW and possible inclusion of LLW.

Attachment A, *Waste Disposal Facilities*, summarizes some of the salient features of each of the five facilities. Included is construction and operating cost information; this provides a reference for potential cost savings for various alternative disposal options.

4. The options we looked at (and what is currently in the baseline)

We considered five options in addition to the current baseline for LLW and MLLW disposal. These are shown in Attachment B, *Options*.

The baseline consists of waste disposal being performed in a combination of existing multiple LLW trenches, two existing MLLW trenches, ERDF, six proposed ILAW trenches and a proposed melter trench.

Option 1 considers combining LLW trench and MLLW trench operations into a new modular trench operated similar to the existing ERDF facility. It also considers sending waste that can meet the ERDF criteria to ERDF. ILAW trenches and melter trench would be built and operated as planned.

Option 2 builds upon Option 1 by eliminating a dedicated melter trench and instead disposing of spent/failed melters in the new modular trench or in ERDF. ILAW trenches would be built and operated as planned.

Option 3 builds upon Option 2 by eliminating all but the first ILAW trench. After the first ILAW trench is filled, future ILAW would be disposed of in the new modular trench or in ERDF. The initial ILAW trench would be built and operated as planned.

Option 4 proposes to eliminate all ILAW trenches and the melter trench. All LLW and MLLW would be disposed of in the new modular trench or in ERDF.

Option 5 proposes to eliminate the new modular trench, all ILAW trenches, and the melter trench. All LLW and MLLW would be disposed of in ERDF, which would be expanded as necessary to accommodate the waste volume.

5. Where we got to (conclusions, options eliminated or preferred)

See Attachment B, *Options*; Attachment C, *Potential Cost Savings Drivers*; and Attachment D, *MLLW Disposal Composite Schedule*.

6. Threshold policy issues

Threshold policy issues related to MLLW are as follows:

- Should we pursue a mega-trench concept for on-site disposal of LLW and/or MLLW?
- What is the Tri-Parties' policy on offsite MLLW?
- Can we qualify RCRA waste as CERCLA waste to enable disposal in ERDF?

Other issues identified by the group include:

- Can we obtain a liner exemption for ILAW and/or melter trench?
- The incidental waste ruling for ILAW is site-specific and would require re-evaluation and concurrence from NRC if the ILAW disposal location is changed.
- Should we modify the TPA so that ILAW does not have to be retrievable?
- Should we amend the ERDF ROD to allow disposal of offsite waste?
- Should we find a method to fund the initial ILAW trench as expense rather than capital, as this could facilitate adopting the Mega-Trench concept while not perturbing the schedule for ILAW receipt?

7. Our recommended path forward (what do we need to do and who needs to be assigned to do it in order for this work to be fully scoped, costed and scheduled for inclusion in the FY03 and onward budget and baseline.)

We recommend:

- That policy issues be addressed and those chosen for resolution be identified before for the next budget planning cycle;
- That a "trade study" be initiated in FY 2003 to provide detailed cost/benefits analysis of the various disposal facility/operation options, using the policy issue resolution as a guide;
- That preparations begin immediately on a Statement of Work for preparation of the trade study;
- That RL/ORP determine the appropriate disposal option and initiate baseline changes;

- That no actions be taken that will negatively impact ongoing activities.

8. Appendices (supporting tables, charts, schedules you have developed)

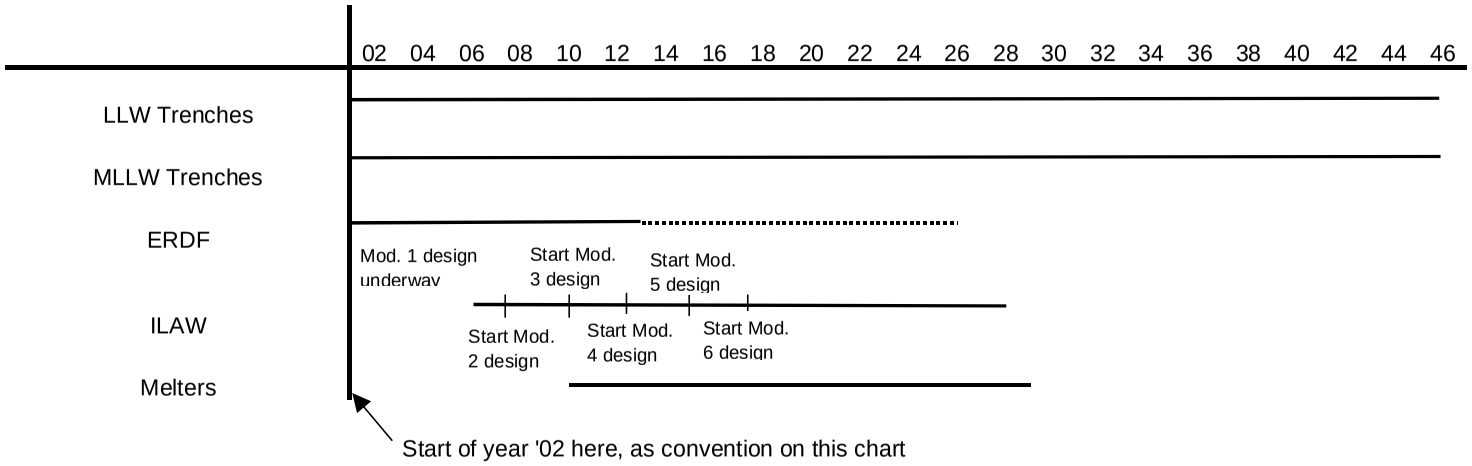
- Attachment A, *Waste Disposal Facilities*
- Attachment B, *Options*
- Attachment C, *Potential Cost Savings Drivers*
- Attachment D, *MLLW Disposal Composite Schedule*.

This report is followed by the June 2002 workshop presentation.

WASTE DISPOSAL FACILITIES

Facility/DOE Office	Disposal Regulations	Disposal Facility Operations	Capital Costs	Operations Costs	Total Costs	Schedule*	Waste Quantity
ERDF/RL	DOE Order 435.1, CERCLA	Building Trades				2002 - ?	
LLW Trenches/RL	DOE Order 435.1	Plant Forces	—	$114M	$114M	2002 - 2046	338,000 m^3
MLLW Trenches/RL	DOE Order 435.1, RCRA	Plant Forces	—	$100M	$100M	2005 - 2046	209,000 m^3
ILAW Trenches/ORP	DOE Order 435.1, RCRA, NRC	TBD	$144M	$200M	$344M	2007 - 2028	210,000 m^3
Melter Trench/ORP	DOE Order 435.1, RCRA	TBD	$29M	$45M	$74M	2010 - 2029	176 m^3

* Does not include closure time



Attachment B

Options
C3T MLLW Disposal Options

Disposal System Configuration		WASTE STREAMS			
		LLW	RCRA MLLW	CERCLA LLW/MLLW	ILAW
Baseline	ERDF			✓ Baseline	
	Current LLW Trenches	✓ Baseline			
	Current MLLW Trenches		✓ Baseline		
	ILAW Trenches				✓ Baseline Liner exemption request
	Spent Melter Trench				
Option 1	ERDF	Qualify compatible waste streams as CERCLA waste	Qualify compatible waste streams as CERCLA waste	✓ Baseline	
	New Modular Trench	✓ (No Issues)	✓ (No Issues)		
	ILAW Trenches				✓ Baseline Liner exemption request
	Spent Melter Trench				
Option 2	ERDF	Qualify compatible waste streams as CERCLA waste	Qualify compatible waste streams as CERCLA waste	✓ Baseline	
	New Modular Trench	✓ (No Issues)	✓ (No Issues)		
	ILAW Trenches				✓ Baseline Liner exemption request
Option 3	ERDF	Qualify compatible waste streams as CERCLA waste	Qualify compatible waste streams as CERCLA waste	✓ Baseline	
	New Modular Trench	✓ (No Issues)	✓ (No Issues)		(After initial ILAW trench filled) Revise PA/incidental waste ruling Special handling for remote handling/retrievability
	ILAW Trench 1				✓ Baseline (initial trench)
Option 4	ERDF	Qualify compatible waste streams as CERCLA waste	Qualify compatible waste streams as CERCLA waste	✓ Baseline	
	New Modular Trench	✓ (No Issues)	✓ (No Issues)		Expense funding for ILAW disposal Revise PA/incidental waste ruling Special handling for remote handling/retrievability
Option 5	ERDF	Qualify as CERCLA waste Adapt ERDF operations for non-compatible waste streams	Qualify as CERCLA waste Adapt ERDF operations for non-compatible waste streams	✓ Baseline	Qualify as CERCLA waste Expense funding for ILAW disposal Revise PA/incidental waste ruling Special handling for remote handling/retrievability

Blue Text = Disposal of Waste Stream in Disposal Unit Involves Major Technical Issue
Red Text = Disposal of Waste Stream in Disposal Unit Involves Major Policy Issue

Disposal System Configuration		WASTE STREAMS		
		Spent Melters	Offsite LLW	Offsite MLLW
Baseline	ERDF			
	Current LLW Trenches		✓ Baseline	
	Current MLLW Trenches			✓ Baseline Tri-Parties' policy for receipt of off-site MLLW
	ILAW Trenches			
	Spent Melter Trench	✓ Baseline Liner exemption request		
Option 1	ERDF			
	New Modular Trench		✓ Tri-Parties' policy for receipt of off-site LLW	✓ Tri-Parties' policy for receipt of off-site MLLW
	ILAW Trenches			
	Spent Melter Trench	✓ Baseline Liner exemption request		
Option 2	ERDF	Qualify as CERCLA waste Special weight/handling requirements		
	New Modular Trench	Special weight/handling requirements	✓ Tri-Parties' policy for receipt of off-site LLW	✓ Tri-Parties' policy for receipt of off-site MLLW
	ILAW Trenches			
Option 3	ERDF	Qualify as CERCLA waste Special weight/handling requirements		
	New Modular Trench	Special weight/handling requirements	✓ Tri-Parties' policy for receipt of off-site LLW	✓ Tri-Parties' policy for receipt of off-site MLLW
	ILAW Trench 1			
Option 4	ERDF	Qualify as CERCLA waste Special weight/handling requirements		
	New Modular Trench	Special weight/handling requirements	✓ Tri-Parties' policy for receipt of off-site LLW	✓ Tri-Parties' policy for receipt of off-site MLLW
Option 5	ERDF	Qualify as CERCLA waste Special weight/handling requirements	ROD amendment to allow disposal of off-site waste in ERDF	ROD amendment to allow disposal of off-site waste in ERDF

Blue Text = Disposal of Waste Stream in Disposal Unit Involves Major Technical Issue
Red Text = Disposal of Waste Stream in Disposal Unit Involves Major Policy Issue

Attachment C

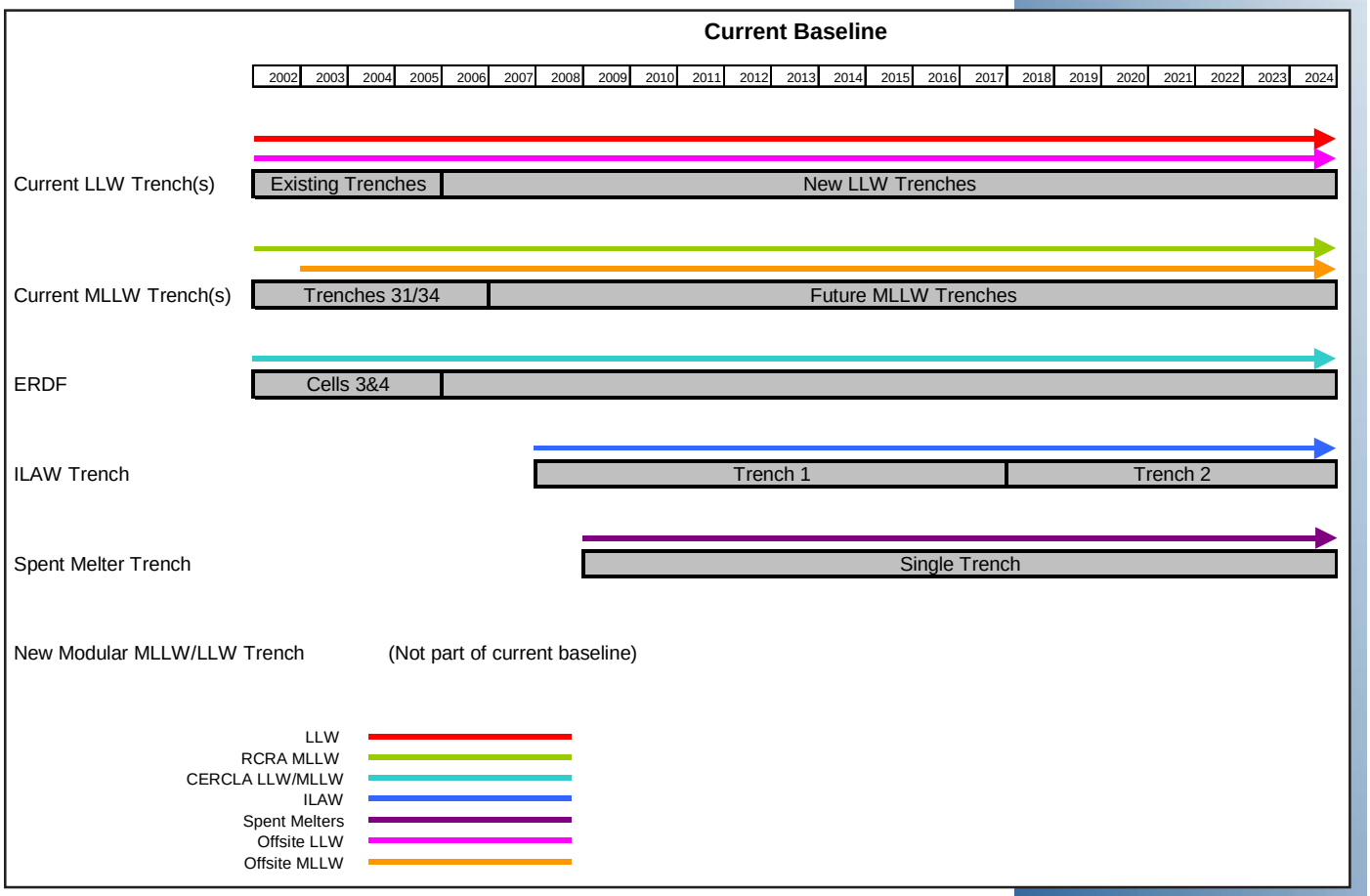
Potential Cost Savings Drivers

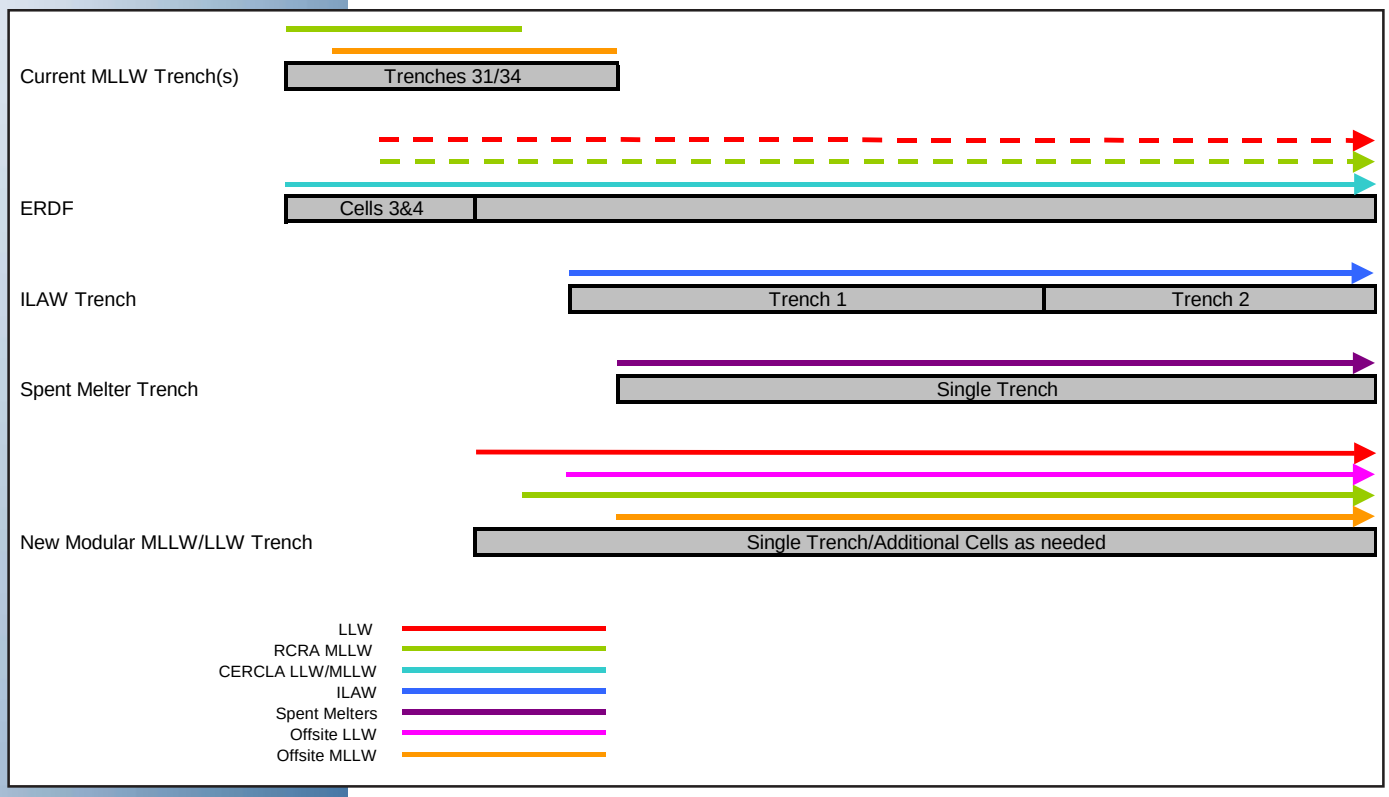
Disposal System Configuration		Facility Drivers	Operational Drivers	Life-Cycle Cost Savings Potential
Baseline	ERDF Current LLW Trenches Current MLLW Trenches ILAW Trenches Spent Melter Trench	NA	NA	NA
Option 1	ERDF New Modular Trench ILAW Trenches Spent Melter Trench	Decreased Footprint	Limited operational consolidation; existing methods used; possible expanded use of ERDF.	TBD%
Option 2	ERDF New Modular Trench ILAW Trenches	Decreased Footprint, Design and Construction of Melter Trench	Limited operational consolidation; existing methods used; eliminate dedicated melter trench; possible expanded use of ERDF.	TBD%
Option 3	ERDF New Modular Trench ILAW Trench 1	Decreased Footprint, Design and Construction of Melter Trench, Construction of Additional ILAW Trenches	Expanded operational consolidation; existing methods used; eliminate dedicated melter trench; possible expanded use of ERDF; eliminate special ILAW trenches 2 through 6.	TBD%
Option 4	ERDF New Modular Trench	Decreased Footprint, Design and Construction of Melter Trench, Capital Project for Construction of ILAW Trenches	Expanded operational consolidation; existing methods used; eliminate dedicated melter trench; possible expanded use of ERDF; eliminate ILAW trenches.	TBD%
Option 5	ERDF	Decreased Footprint, Design and Construction of Melter Trench, Capital Project for Construction of ILAW Trenches	Consolidated Operations	TBD%

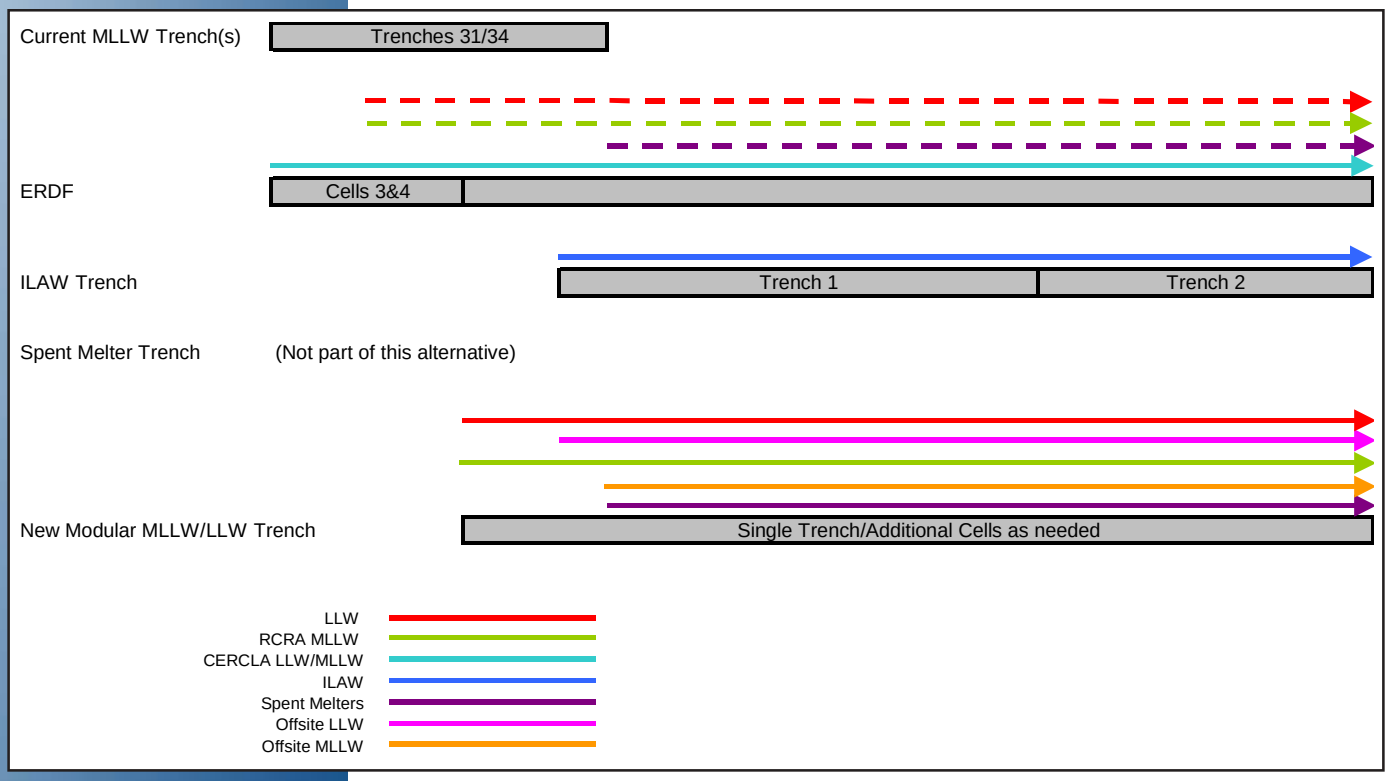
Note: New modular trench operation would be more cost effective to the extent that ERDF techniques can be used.

Attachment D

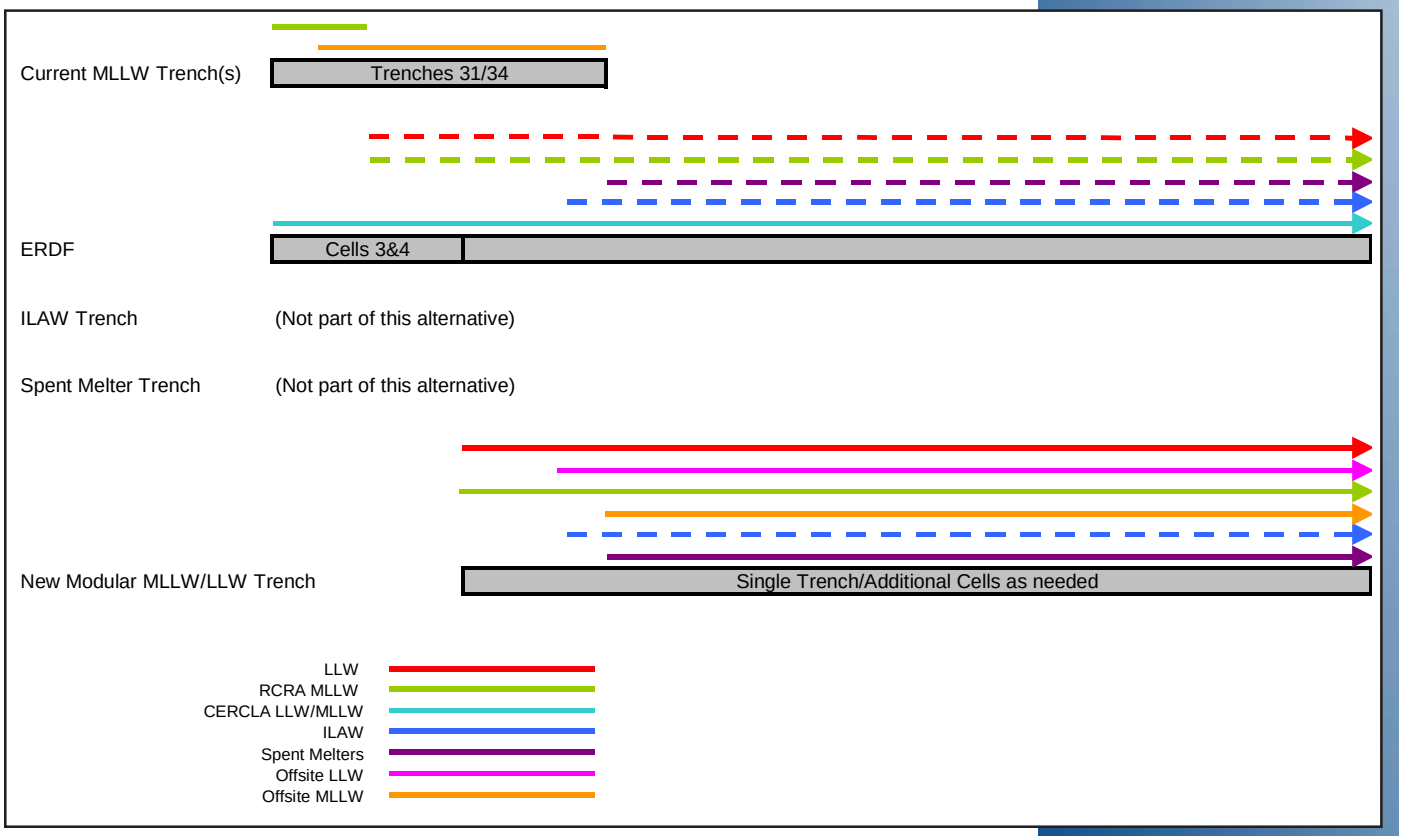
MLLW Disposal Composite Schedules

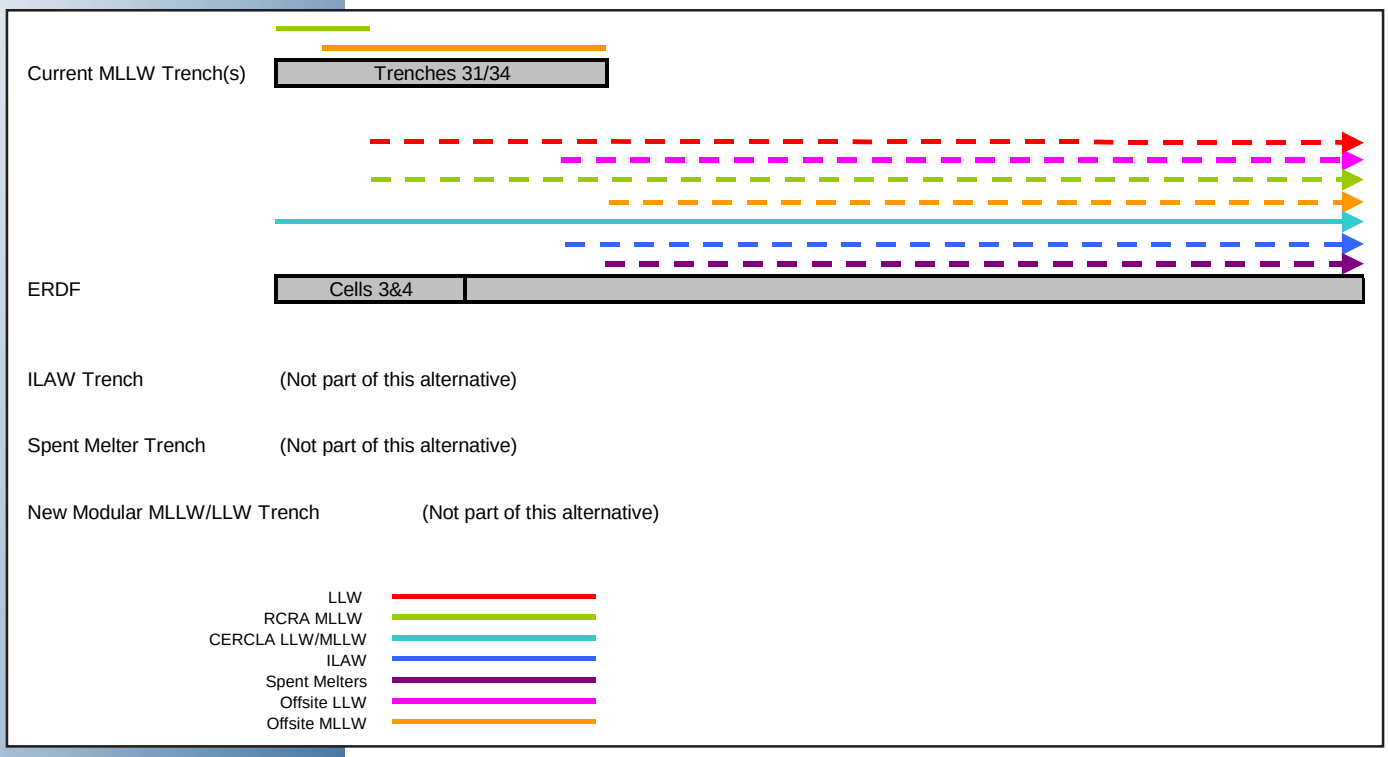



Current MLLW Trench(s)
Trenches 31/34
ERDF
Cells 3&4
ILAW Trench
Trench 1
Trench 2
Spent Melter Trench
Single Trench
New Modular MLLW/LLW Trench
Single Trench/Additional Cells as needed
LLW
RCRA MLLW
CERCLA LLW/MLLW
ILAW
Spent Melters
Offsite LLW
Offsite MLLW


Current MLLW Trench(s)
Trenches 31/34
ERDF
Cells 3&4
ILAW Trench
Trench 1
Trench 2
Spent Melter Trench
(Not part of this alternative)
New Modular MLLW/LLW Trench
Single Trench/Additional Cells as needed
LLW
RCRA MLLW
CERCLA LLW/MLLW
ILAW
Spent Melters
Offsite LLW
Offsite MLLW


Current MLLW Trench(s)
Trenches 31/34
ERDF
Cells 3&4
ILAW Trench
Trench 1
Spent Melter Trench
(Not part of this alternative)
New Modular MLLW/LLW Trench
Single Trench/Additional Cells as needed
LLW
RCRA MLLW
CERCLA LLW/MLLW
ILAW
Spent Melters
Offsite LLW
Offsite MLLW


Current MLLW Trench(s)
Trenches 31/34
ERDF
Cells 3&4
ILAW Trench
(Not part of this alternative)
Spent Melter Trench
(Not part of this alternative)
New Modular MLLW/LLW Trench
Single Trench/Additional Cells as needed
LLW
RCRA MLLW
CERCLA LLW/MLLW
ILAW
Spent Melters
Offsite LLW
Offsite MLLW



C3T MLLW Disposal Options Sub-Team

Ken Hladek

June 2002

Background – MLLW and LLW Disposal

- **Disposal Units**
  - LLW trenches
  - MLLW trenches
  - ERDF
  - Planned ILAW trenches
  - Planned Melter trench
- **Contractors**
  - FH
  - CHG
  - BHI
- **Regulatory Bases**
  - RCRA
  - CERCLA
  - DOE
  - NRC

Options

- **Option 1** – Combine LLW and MLLW trench operation into Mega-Trench and/or ERDF
- **Option 2** – Dispose of melters in with LLW and MLLW in Mega-Trench and/or ERDF
- **Option 3** – Add all ILAW except the initial trench in to the Mega-Trench and/or ERDF
- **Option 4** – Add all ILAW into the Mega-Trench and/or ERDF
- **Option 5** – All LLW, MLLW, ILAW and melters disposed of in ERDF

Policy Issues

Threshold policy issues related to MLLW are as follows:

- Should we pursue a mega-trench concept for on-site disposal of LLW and/or MLLW?
- What is the Tri-Parties' policy on offsite MLLW?
- Can we qualify RCRA waste as CERCLA waste to enable disposal in ERDF?

Policy Issues

Other issues identified by the group include:

- Can we obtain a liner exemption for ILAW and/or melter trench?
- The incidental waste ruling for ILAW is site-specific and would require re-evaluation and concurrence from NRC if the ILAW disposal location is changed.
- Should we modify the TPA so that ILAW does not have to be retrievable?
- Should we amend the ERDF ROD to allow disposal of offsite waste?
- Should we find a method to fund the initial ILAW trench as expense rather than capital, as this could facilitate adopting the Mega-Trench concept while not perturbing the schedule for ILAW receipt?

Path Forward

- That policy issues be addressed and those chosen for resolution be identified before for the next budget planning cycle;
- That a “trade study” be initiated in FY 2003 to provide detailed cost/benefits analysis of the various disposal facility/operation options, using the policy issue resolution as a guide;
- That work begin immediately on a Statement of Work for preparation of the trade study;
- That RL/ORP determine the appropriate disposal option and initiate baseline changes;
- That no actions be taken that will negatively impact ongoing activities.

What do we need?

We need the policy makers to evaluate the policy issues.

- Do you need additional information?
- Which options/issues can you support and which ones are not acceptable?

Policy guidance will help us set the scope of the trade study.

F2 - Canyon Options Sub-Group

C3T Canyon Disposition Acceleration

June 21, 2002 Gary MacFarlan

C3T Canyon Disposition Acceleration

CDI Facility Location / Design

C3T Canyon Disposition Acceleration

Present U-Plant CDI Status:

- Pursuing Final ROD versus Interim ROD
- Feasibility Study and Proposed Plan need to be revised
  - No external waste disposed
  - Risk Assessment
  - Cost
- CDI transferring to FH July 1st
  - Bill Bailey - Director, 200 Area Shutdown Facilities
  - Lloyd Zinsli - Project Manager, 200 Area Shutdown Facilities

C3T Canyon Disposition Acceleration

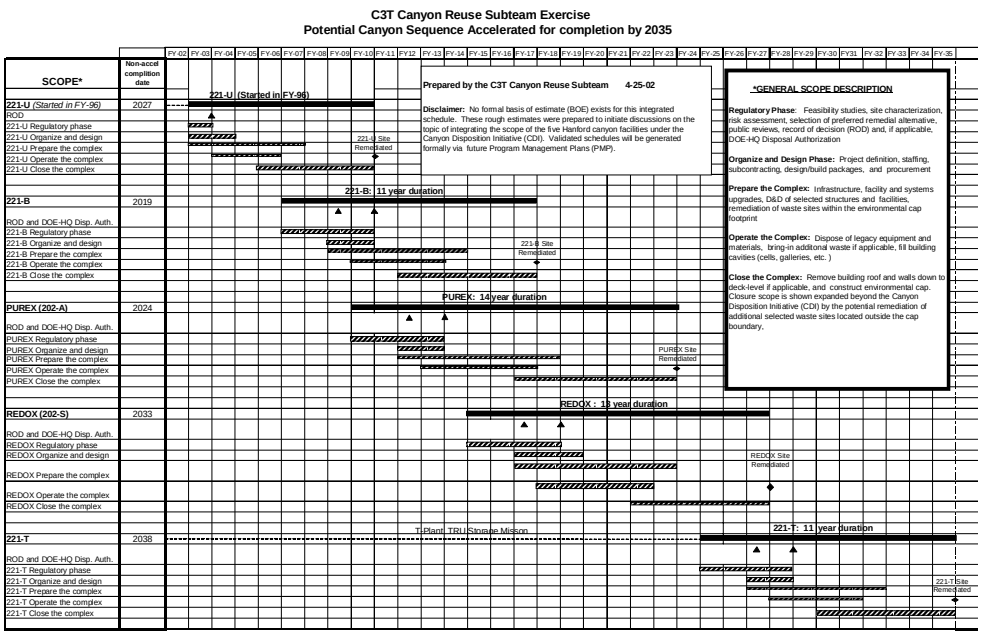
Statement of Scope:

- The Canyon Re-Use Sub-Team scope was to determine if the canyons provide a valid target of opportunity to help accelerate the clean up of the Hanford Site. Although the team focused mainly on the re-use of U-Plant, the recommendations from the team can be translated to the other four canyon facilities. The sub-team members are as follows:

- Gary M. MacFarlan (BHI) Team Lead
- George Cox (FH)
- Craig Cameron (EPA)
- Matt Mills (Ecology)
- Rick Bond (Ecology)
- Arlene Tortoso (DOE-RL)

C3T Canyon Disposition Acceleration

C3T Schedule:



C3T Canyon Disposition Acceleration

Basic Agreed to Assumptions :

- Associated waste sites and facilities remediation will be coordinated with CDI schedule
- No major delays due to unforeseen discoveries of legacy materials in the facilities or associated waste sites
- Barrier construction materials will be available
- No external waste will be brought into U-Plant
- Minimal-to-no volume reduction of existing waste and materials presently located in U-Plant

C3T Canyon Disposition Acceleration

Basic Agreed to Assumptions:

- U-Plant
  - Alternative 6 is the baseline
- B-Plant
  - WESF mission will be completed to meet schedule
- PUREX
  - Tunnel disposition will be resolved to meet schedule
- REDOX
  - Alternative 6 is the baseline
- T-Plant
  - T-Plant mission schedule re-aligned to meet schedule

C3T Canyon Disposition Acceleration

Key Decision/Policy Issues:

- Initiative Specific Issues (local):
  - Material sources for construction of barriers not identified
  - Remediation of waste sites located within the footprint of CDI not within the scope of canyon facilities D&D
  - Current 221-T mission schedule will need to be re-aligned to complete all canyons by 2035
- Initiative Specific Issues (external):
  - DOE-HQ approval of final disposal of external waste
  - High profile barrier design and associated construction issues

C3T Canyon Disposition Acceleration

Key Decision/Policy Issues:

- RCRA, CERCLA, NEPA, and/or 435.1 Coordination
  - The regulatory path for each canyon must be established early
  - Interim Action ROD versus Final ROD
  - Other canyon ROD may not be the same as the U-Plant ROD
- 435.1 Implementation
  - External waste forms not yet determined
  - Acknowledgement that alternative selected is a final disposition option
- Risk/Quality Assessments and Decisions
  - Process needs to be identified to allow risk assessment completion based on predicted waste

C3T Canyon Disposition Acceleration

Cost:

- 221-U is the only canyon with an estimate to date for in-situ disposition $70M (ROM)
- No current valid cost estimate exist for B-Plant, T-Plant, PUREX, or REDOX in-situ disposition
- Significant differences in the scope for in-situ disposition exist between canyon facilities, such that extrapolation of cost estimates using U-Plant as a baseline is not recommended (i.e.. PUREX Tunnels, etc.)

C3T Canyon Disposition Acceleration

Site Benefits:

- Accelerates closure of the first canyon by approx. ten years
- Establishes a breakthrough regulatory pathway for in-place disposition of the canyon facilities
- Disposition in-place greatly reduces site worker risks
- Contributes to the closure of specific 200 area plateau geographic zones
- Some canyon facilities may provide alternative disposal of site high value waste
- Provides platform for the development and validation of high-profile environmental barriers

C3T Canyon Disposition Acceleration

Recommendations:

- Continue the implementation of the accelerated disposition of U-Plant by 2010
- Assign a team to develop plans, scope, and schedule for the remaining four canyons
- Integrate the disposition of the waste sites surrounding the canyon facilities
- Continue search for high-value waste potential disposal in the canyon facilities

F3 - TRU Waste Sub-Group

C3T TRU Waste Sub-Team

Ken Hladek

June 2002

Statement of Scope (Team Charter)

- Should a risk-based waste retrieval study be conducted for relevant transuranics-containing waste streams?

Agreements Reached by the Subgroup

- Develop and apply a consistent risk-based strategy for retrieval of pre- and post-70 TRU.
- Wastes streams included in the study:

Waste Source	Waste Volume, m^3	Pu Quantity, kg	Life-Cycle Costs, $M
200 Area Soil Sites	32,000	190	?
Pre-70 Burial Grounds	141,607	350	?
Suspect TRU (Post-70)	7,980	200	45
200 Area Caissons	25	<1	60
PUREX Tunnels	700	65	?

Agreements Reached by the Subgroup (continued)

- Waste streams not to be included:

Waste Source	Waste Volume, m^3	Pu Quantity, kg	Life-Cycle Costs, $M
618-10/11	9,700	10	450
Tank Farms Residuals (from tanks)	?	?	?

(The streams above are covered elsewhere.)

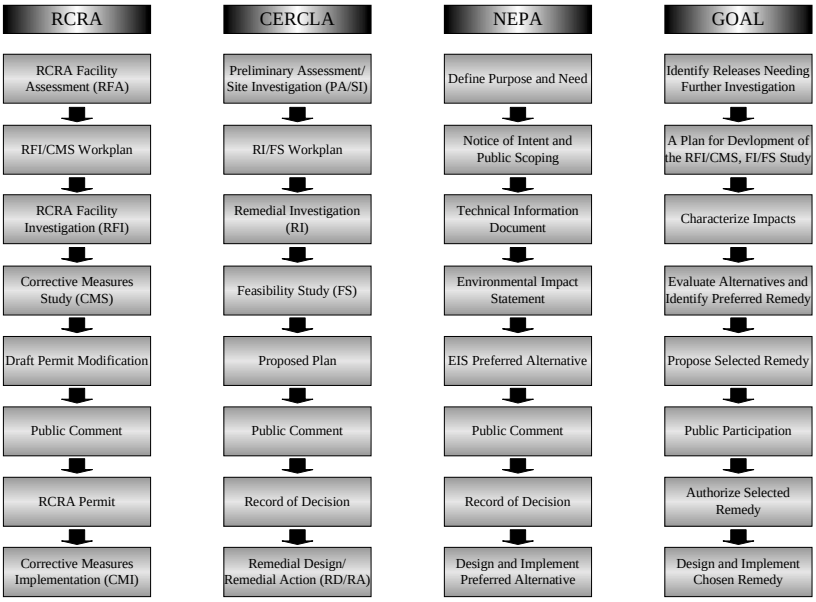
Stored TRU (CWC) and forecasted TRU waste; all being shipped to WIPP.

15,000 drums of suspect TRU to be retrieved by Sept. 2006

Things Not Agreed Upon

- What is a “Risk Based Study?”
- How this Study fits within existing decision making processes:
  - CERCLA
  - RCRA
  - NEPA

Risk-Based Decision Processes Comparison



Path Forward Schedule

- Complete a risk-based flow chart or decision matrix: 7-30-02
- Develop work task packages: 8-15-02
- Provide cost/schedule estimate: 9-15-02
- Initiate study: 10-1-02

Key Decision/Policy Issues Requiring Resolution

- Acceptability at WIPP of Pre-1970 waste containing transuranics
- Not retrieving Post-1970 TRU waste (Treat Pre- and Post-1970 TRU consistently)
- Which decision platform (CERCLA, RCRA, NEPA) should this study support?

Benefits to the Site/Potential Cost Savings from Implementation of the Opportunity

- TRU waste retrieval: Risk-based not policy-based.
- Cost/schedule benefit: To be determined during study.

Appendix G – ORP/RL Baseline Integration & Infrastructure Optimization (Site Infrastructure and Services)

Results of the
ORP/RL Baseline Integration and Optimization
C3T Initiatives

Steve Wisness
Closure Division

July 30, 2002

Background

Several of the targets of opportunity identified by the Cleanup, Constraints, and Challenges Team (C3T) activity were grouped together as the ORP/RL Baseline Integration & Optimization Team, lead by Steve Wisness. The specific targets assigned were #5 - K Basin Integration, #8 – Infrastructure Integration, #9 – Water Use, and #10 Laboratory Optimization.

The scope established in the team charter was:

> *This effort will establish a vision and implementing strategies to optimize infrastructure and site services, maximize the analytical lab value by integrating existing site needs with emerging needs for the Waste Treatment Plant, integrate K-basin deactivation and ancillary facility D&D with other D&D activities, and reduce the central plateau population to the level that best supports accelerated site closure. These strategies will be based on a consistent set of assumptions and will be justified by supporting information. The resulting strategies will provide a basis for evaluating existing plans, assessing gaps and establishing tasks needed to realize the expectations. The strategies will guide field activities for the Department of Energy and its contractors.*

The following purposes and objectives were established:

- Build an overall strategy that will guide the long-term remediation and disposition of site infrastructure and services.
- Articulate the endpoints with sufficient precision to determine the needed lifespan of the various infrastructure elements and services and the desired condition they should be in for disposition; e.g., "run to failure" or "maintain for turnover."
- Minimize duplication of capabilities and services.
- Reduce life-cycle costs consistent with above objectives.

Guiding principles were established to bound the discussions and steer the results:

- Insure that no further harm is done to the groundwater due to operational activities.
- As the site footprint shrinks, be proactive in minimizing the infrastructure that must remain behind to sustain ongoing operations.
- Meet the regulatory requirements.
- Build upon, integrate with, and leverage ongoing and related efforts:
  - Impacts/opportunities arising from C3T activities.
  - Existing DOE and contractor strategic planning activities.
  - Guidance and expectations from the various stakeholders.
- Develop a long-term strategy that maintains the flexibility to support emerging needs.
- Clearly articulate the incremental costs incurred by the taxpayer associated with maintaining the capability of supporting multiple outcomes.
- Initiatives identified relating to maintaining infrastructure may influence Project decisions based on apparent return on investment. Project decisions may drive infrastructure and vice versa.

The principal team members were:

- Dawn Adams – Fluor Hanford Site Operations
- Scott Bennion – Fluor Hanford Site Operations
- Beth Bilson – DOE/RL River Corridor Assistant Manager
- Steve Burnum – DOE/RL Site Services Division
- Bill Ferree – Fluor Hanford Site Operations
- Larry Gadbois – Environmental Protection Agency
- Duane Renberger – Fluor Hanford Site Operations
- Rich Slocum – Fluor Hanford Site Operations
- Steve Wisness – DOE/RL Site Services Division (Team Lead)
- John Wood – Fluor Hanford Site Operations
- Jerry Yokel – Ecology

Many other people participated in discussions and decisions on specific subjects. Subject matter experts and those with decision-making authority were involved as appropriate to deal with more detailed discussions.

Summary of Results

The analytical labs task was addressed by a joint DOE/RL and Office of River Protection (ORP) team that developed an appropriate strategy and recommended a path forward. The water use and infrastructure integration tasks were merged with a resulting plan to aggressively move people offsite and shrink the support infrastructure. The K Basin D&D integration was addressed through a joint workshop with the Spent Nuclear Fuel project and the River Corridor project that validated integration plans and identified improvements.

Analytical Labs

The joint strategy team developed a detailed analysis of available alternatives and provided five recommendations to reduce the complexity of the new Waste Treatment Plant by better utilizing existing on- and off-site capabilities. The recommendations were:

- ORP should direct BNI to revise the WTP laboratory scope to eliminate the requirement for analyzing tank farm cores and grab samples.
- Prior to making a decision with respect to low-level analyses, ORP should assess the capabilities of WSCF and commercial laboratories to support WTP processing at expanded treatment capacities.
- The WTP laboratory should be designed to facilitate future expansions to perform the services now provided by 222-S and 325. The WTP site plans need to be assessed for the ability to expand the analytical laboratory. A study to identify specific costs, benefits, and approaches to expansion should be performed after the WTP is in operation and the process is proven.
- Interfaces should be established to:
  - Identify and address potential labor and personnel issues associated with laboratory operation.
  - Pursue integration of site analytical laboratory systems (quality assurance, training, procedures, etc.) where site benefits can be realized.
- Infrastructure upgrades to 222-S, 325, and WSCF should be implemented to assure laboratory availability to meet site analytical and research & technology needs.

ORP has issued direction to Bechtel National based on the team recommendations. The strategy will be reviewed annually to assure its continued feasibility.

Infrastructure

A series of 6 brainstorming sessions were held to develop improvements to the overall site infrastructure. The resulting 181 suggestions were prioritized based on a subjective assessment of potential benefit and feasibility. The top 33 were screened through qualitative assessments by subject matter experts to assess benefits, risks and obstacles.

A number of the ideas did not fit within the framework of the C3T activities and are being pursued within the normal planning activities of Fluor Hanford Site Operations. Those changes that were carried forward were to minimize the on-site population, aggressively eliminate services for vacated facilities and minimize service levels to reflect a shrinking cleanup environment.

DOE/RL has provided direction to Fluor Hanford to prepare a plan for moving as many personnel offsite as is practical. The remaining population will be consolidated whenever possible to minimize infrastructure demands.

As a result of the June 27 and 28 C3T workshop it was determined that upgrades to leaky water systems in selected areas should receive high priority due to potential for driving additional contaminants into the groundwater. It was also determined that issues with water systems should be coordinated with the Integrated Groundwater Monitoring, Assessment and Protection Team.

K Basin Integration

A facilitated workshop with the Spent Nuclear Fuel Project (SNF) and the River Corridor Project (RC) was held to review the integration and coordination of the two projects as well as to search for improvement opportunities. The workshop confirmed that the two projects are in fact well coordinated. While some improvement opportunities were identified and are being pursued, the overall conclusion was that both contractors have a common understanding of needs and are working in concert.

The principle agreements reached during the workshop were to move forward on early turnover of some ancillary facilities while trying to accelerate turnover of one of the two basins, revising the end-point criteria to better match real needs, and to coordinate the characterization of the basin contamination

Current plans are to turnover both basins and all ancillary structures to RC at the end of the SNF project. This timing puts considerable pressure on a TPA milestone for RC as well as causing load leveling problems. The two projects will work together for early turnover of as many ancillary structures as is reasonable. SNF will also make a priority of accelerating turnover of one of the basins to RC.

Established end-point criteria are probably too conservative for the needs of the D&D activities. The two projects will work together to establish end-point criteria that better reflect the actual needs.

SNF is preparing to characterize the contamination of the basins so that decisions can be made on the appropriate cleanup method. Preparation for this characterization will be coordinated with RC and with the Nuclear Safety organization to ensure that the needs of all three organizations are met with a single study.

U.S. Department of Energy
Richland Operations Office
Richland, Washington 99352